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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Lord Brotherton—Messel Lecturer

THE announcement that Baron Brotherton of Wakefield has been chosen as the Messel Lecturer for 1930 will be received with general satisfaction. If, indeed, it were followed later by the announcement that he was to fill the chair of the Society of Chemical Industry it would be a double satisfaction. The Messel Lecture for 1930 will, of course, be delivered at the annual meeting of the Society in Birmingham in the summer. It was established in memory of the late Dr. Rudolph Messel, who left the bulk of a considerable fortune in aid of chemical education and research, and the Medal which accompanies it is awarded for meritorious distinction in science, industry or literature.

The four previous Messel Lecturers are Professor H. E. Armstrong, who, at the Glasgow meeting, told us much about Rudolph Messel himself, the late Lord Leverhulme, whose address at Liverpool took the form of a personal testament of his industrial and social faith, Earl Balfour, who at the London conference dealt with the subject of research and industry, and Dr. R. A. Millikan, the eminent American physicist, whose lecture was delivered to the members of the Society in New York in the autumn of 1928.

Lord Brotherton may be trusted worthily to maintain the high tradition established by his predecessors, and although his subject has not yet been announced the Lecture is certain to be worth hearing. Lord Brotherton has been a member of the Society since its foundation close on fifty years ago, and is one of its vice-presidents. Independently of this, however, he is widely known as the head of Brotherton and Co., one of the best known of British chemical manufacturing firms, and as a munificent contributor to public and especially educational causes. For several years he sat in the House of Commons as the Conservative member for Wakefield.

A Boom in Chemical Exports

IF the December trade returns are any criterion, the chemical industry seems to have a prosperous new year before it. For that month, exports of chemicals, drugs, dyes and colours exceeded in value those of December, 1928, by well over half-a-million pounds. For the whole of the year 1929 exports exceed in valud those of 1928 by £1,215,681. On the import side, the value for December, 1929, is up by £215,365 as comparee with the 1928 figure, while for the whole year 1929 import values increased by £1,486,038 as compared with 1928. It is true that the export increase was less than that of imports, but it must be remembered that for some unknown reason there were a few very patchy months. The recovery has, however, been steady and complete, and a few more months like December, 1929, will more than redress the balance.

As regards export details, ammonium sulphate is once more well to the fore. In December, 1929, exports rose to 89,039 tons valued at £830,738, an increase of over 50,000 tons and £500,000 as compared with December, 1928; the trade in ammonium sulphate has, in fact, taking the two Decembers as a basis, been very nearly trebled. For the whole of the year 1929 the exports of ammonium sulphate were nearly 600,000 tons, valued at nearly £6,000,000. Truly a colossal industry! The trade in sodium compounds is also booming, exports in December, 1929, being nearly double those in December, 1928, the value having increased by about £60,000: for the whole year, however, there has been a slight drop in value. The dyestuff industry continues its steady progress: in December 1929 exports were 4,000 cwt. higher than in the previous December. It may be noted that for the year 1929 the value of dyes and dyestuffs exported amounted to over £1,000,000 (coal tar products accounting for £984,222). The one dark spot is the export of coal tar products, which shows a decline in quantity and value.

On the import side the month of December and the

whole of the year 1929 show a heavy falling-off in the imports of crude glycerine. Imports of sodium nitrate fell by over half on the month, and the value by nearly two-thirds; while for the whole year there was an increase in quantity and a decrease in value. Imports of borax increased by nearly 20,000 cwt. on the month, and values both on the month and the year showed increases. It is necessary to make the usual complaint with regard to the item described under the heading "all other sorts" in the import list; this showed an increase on the month of £40,000, and on the year of £900,000: it is time that a little more information was given with regard to it.

Benn Brothers' Jubilee Year

In connection with the celebration of the Jubilee of Benn Brothers, Ltd., which falls this year, it is interesting to note that the Lord Privy Seal (Mr. J. H. Thomas, M.P.) will be the guest of honour at a jubilee dinner that the firm are giving at the Wharncliffe Rooms, London, on February 1. It is expected that Mr. Thomas will refer, among other topics, to the part of the press in stimulating and expanding national trade. From this point of view, the importance of the trade and technical press has been receiving increasing recognition for some years past, for its chief merit is the directness of its appeal to the actual trading community, as distinct from the general public. One of the greatest services that the firm of Benn Brothers have rendered in this relation is that of taking the trade and technical press out of the back streets it formerly occupied and putting it into the front rank of newspaper publishing.

Relief from Crushing Taxation

The most urgent national question for British industry at the moment is the state of the national finances. Since the present Government have been in office they have undertaken a large number of fresh commitments which make an increase of national taxation in the next Budget certain. Ministers, indeed, make no secret of the prospect of higher taxation this year. One of the foremost services which business men of every class can render to the trades they represent is to keep this question of ever-increasing taxation constantly before their minds. What British trade wants for needed expansion, which, in the long run can be the only cure for unemployment, is a reduction, not an increase, of taxation.

The chief competitors of Great Britain clearly realise this, as the following recent announcements show:—

The German Government last month revealed a programme for a 25 per cent. reduction of income tax in three stages over a period of three years.

The Italian Cabinet last July approved proposals to reduce taxation by £5,500,000 a year.

The French Commission of Finance last month accepted figures of £9,000,000, which, added to reductions already voted, brought the total tax relief of France during the ensuing year to £22,000,000.

President Hoover last month laid before the United States Congress a recommendation that taxes upon incomes for 1929 should be reduced by £32,000,000.

The Norwegian Government has submitted estimates for 1930–31 with a proposal for a reduction of taxation.

The King of Sweden, opening his Parliament last week, foreshadowed a reduction of the income tax.

The contrast between Great Britain's policy of lightheartedly adding to the burdens of industry, and its serious competitors' policy of steadily lightening them, should appeal to everyone concerned in the prosperity of this country. The trading community, as a duty both to themselves and to the nation, should take every opportunity, especially in view of the prospective Budget, of emphasising the pressing need of national economy, if this country is to hold its ground against more favoured competitors.

Books Received

Fuel Research Special Report No. 5. Fires in Steamship Bunker and Cargo Coal. Pp. 55. 2s.

Water Pollution Research. Summary of Current Literature. Vol. III. No. 1. January, 1930. Abstract Nos. 1-119. London: H.M. Stationery Office. Pp. 36. 1s. 3d.

Standard Specifications for Benzole and Allied Products, 1929. London: The National Benzole Association. Pp. 145. 6s.

Molecular Spectra and Molecular Structure. A General Discussion held by the Faraday Society. September, 1929. Pp. 354. 15s. 6d.

The Calendar

Jan. 20	University of Birmingham Chemical Society: "Current Views of the Chemistry of Muscle Processes." J. Pryde.	University, Birmingham.
21-28	Royal Institution: "Isotopes." Dr. F. W. Aston. 5.15 p.m.	21, Albemarle Street, London.
21	Leicester Literary and Philosophical Society: "Manufacture of Synthetic Nitrogen." M. P. Applebey. 8 p.m.	College of Technology, Leicester.
21	Society of Chemical Industry (Birmingham and Midland Section): "Chrome Plating." E. J. Dobbs. 6.30 p.m.	Chamber of Commerce, New Street, Birmingham.
21	Institute of Chemistry (Huddersfield Section): "The Application of Spray Drying to Industry and its Relation to other Methods of Evaporation and Drying." T. B. Philip. 7.30 p.m.	Huddersfield.
22	Society of Chemical Industry (Newcastle Section): Visit to Dunston Distillation Plant. 2 p.m.	Newcastle.
23	Institution of the Rubber Industry: "Some Aspects of Standardisation." B. D. Porritt.	Manchester Café, Ltd. Exchange Buildings, Manchester.
23	Institute of Chemistry (Belfast Section): "South Africa." Dr. G. Scott Robertson. 7.30 p.m.	Royal Belfast Academical Institution, Belfast.
25	Midland Chemists' Dinner.	Midland Hotel, Birmingham.
27	Society of Chemical Industry (Yorkshire Section): "Decay of Material by Bacterial Growth." F. A. Mason.	Leeds.
30	British Chemical Plant Manufacturers' Association. Annual dinner. 7 p.m.	Jules Restaurant, Jermyn Street, London.
Feb. 4	Royal Institution: "Isotopes" (III). Dr. F. W. Aston. 5.15 p.m.	21, Albemarle Street, London.
12	Institute of Fuel: "Oil Cracking." W. H. Jones.	Burlington House, Piccadilly, London.
Mar. 6	Institute of Fuel: "The Cleaning of Coal." Dr. F. S. Sinnatt.	Bristol.
12	Institute of Fuel: "The History and Development of Submerged Combustion." C. F. Hammond.	Burlington House, Piccadilly, London.

Closing Stages of the Dyestuffs Patent Action

Counsels' Addresses Commenced

On Tuesday, the hearing of the patent action between Imperial Chemical Industries and the I.G. was resumed before Mr. Justice Maugham. Accounts of the earlier proceedings appeared in THE CHEMICAL AGE *on November 23 and 30, and December 7, 14, 21, and 28.*

MR. Lloyd Jacob, for the petitioners (I.C.I.), continued his speech, and said that at the close of last sittings he summed up the petitioners' case and dealt with the question of the amendments. He would now deal with the general validity of the patents and subject matter, and also deal generally with the nature of the patents. The question was one of great importance and profound interest to the chemical industry. So far as he could find, there was no authority on selection patents. It was desirable that the law should be made clear as to the position of inventors with regard to any discoveries and inventions they might make.

Selection Patents

His lordship: Are there any selection patents except in connection with chemistry, food and products?

Mr. Jacob thought not.

His lordship: Can you have selection mechanical patents?

Mr. Jacob: With respect, why not? You could have a particular method of the Watt invention. The phrase has crept in, and as far as I know has never been defined. It can only be used for two purposes, to describe some particular form, or that a particular form shall be required.

In the Act, said Mr. Jacob, there was nothing to guide the Court in the matter. In the main, the phrase had arisen chiefly in chemical cases.

His lordship said that surely the word "patent" had some meaning. In the case of selection patents, there appeared, however, to be a distinction. There was such a thing as would justify the description of an invention as an originating invention. Somebody started something nobody had ever thought of before, and that might be regarded of itself as novelty. Those inventions were very different in their nature. His lordship understood selection patent as a phrase properly applied to inventions which simply related to what Mr. Cripps, K.C., had called certain numbers of a particular class, generally the chemical class, and which resulted in some particular advantage.

Mr. Jacob submitted that there was a difference in degree between every invention.

His lordship: I am saying it is a totally different thing to which we apply the same word.

Mr. Jacob: The same invention, but different degrees of invention. The first criterion is that it must be a patentable invention. If you disclose a patentable invention, then you can get a valid patent for it.

His lordship: The whole ambiguity is patentable invention. I suggest that that is where you want to throw light, and to do this you must consider what you mean by the word "invention." It is an artificial word in patent law.

Mr. Jacob said that in every patentable invention there would be novelty—something that was patentable. The 1912 patent of the respondents was the original patent for couplings, and it lasted 16 years. At the expiration of that period the public were entitled to the benefit of the invention. What was the position now that the patents had expired? So far from the public being able to use these monopolies, they were prevented by the action taken by the respondents.

Novelty, continued counsel, was a question of fact for his lordship. If the alleged new method of manufacture was in the possession of the public prior to the grant, there was no consideration here at all. The question was, what did the prior knowledge of the art disclose and what did the patents in the suit protect? Proceeding, counsel read the evidence given on the point of novelty and prior knowledge, and argued that on the balance the evidence was in favour of the petitioners.

Subject Matter

Dealing with the point as to subject matter, Mr. Jacob submitted that the Court could not read into the claim something more than mere manufacture. His contention was, that having regard to the question of knowledge, there was neither novelty nor subject matter in these 1922 patents and that they were invalid. If the advantage was kier boiling, no such claim was made in the specification.

His lordship thought that all that kier boiling meant was a process of preparing goods for the market after being dyed with azo dyes.

Mr. Jacob said that in his submission there was nothing in the possession of this process of fastness to kier boiling. It was all part of general knowledge.

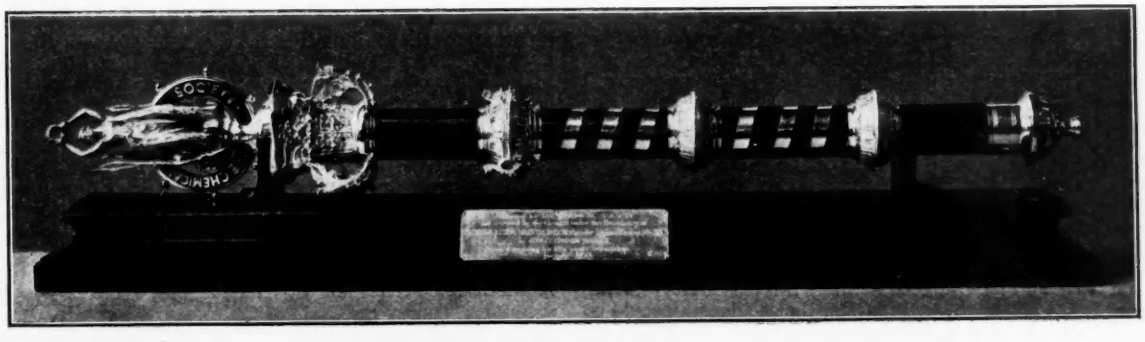
In going through the evidence, counsel drew the attention of his lordship to the fact that the dyeing done by the petitioners was as good as that done by the respondents, and in some cases the witnesses had given the petitioners' dyes an excellency over those of the respondents.

On Wednesday, Mr. Jacob continued his arguments and said it was expressed in the patent that azo dyestuffs resisted caustic soda solution boiling. It was true that the patent did not deal with their boiling. The dyes had to satisfy resistance to boiling in caustic soda solution.

[*Continued on next page*].

A Silver Mace for the Chemical Society

BELOW is a photograph of a very beautiful silver mace which, at an ordinary meeting of the Chemical Society at Burlington House, London, on Thursday evening, was presented to the Society by Mr. Ayerst Henham Hooker, F.I.C., F.C.S. The mace, which was accepted on behalf of the Society by the President (Professor Thorpe) bears the following inscription:—"Presented to the Chemical Society and accepted by the Council under the presidency of Professor Jocelyn Field Thorpe, C.B.E., Chevalier Legion d'Honneur, D.Sc., F.R.S., by Ayerst Henham Hooker on completing his fifty years' fellowship. January, 1930."



His Lordship: I do not read the specification of the patent as imposing any test to pass kier boiling.

Mr. Jacob: I understand that according to the dyestuffs patent of 6379 there is an expression that they were to be fast to boiling in a caustic soda solution.

His Lordship said as he read the specification it did not read that the dyes were to be fast to commercial kier boiling.

Mr. Jacob submitted that the specification admitted that azo dyestuffs might be used as passing the test to boiling in caustic soda solution. There was a "boiling" indicated in the patent, whatever that might mean.

His Lordship: I read it as saying that there is a certain resistance to caustic soda solution.

Mr. Jacob: I say it means that they are fast to kier boiling as mentioned in this patent.

His Lordship: I understand your submission, but it does not say it is fast to commercial kier boiling.

Mr. Jacob submitted that there was no inventive step in the suggestion that the azo dyestuffs resisted caustic soda boiling.

Bleaching

Counsel then detailed the procedure adopted in procuring goods for bleaching and said, if there was a change of tone in the course of bleaching it might entirely change the colour harmony between the threads, with the result that the merchant would refuse to take the goods and the bleacher would lose. With regard to a card of selected patents showing the dyes of petitioners and respondents, he contended that the selected were no better than the unselected dyes.

Mr. Jacob further argued that if the patents were directed to kier boiling they had been obtained by false suggestion. It was now admitted and proved that certain couplings representative of the selection patents were not fast to kier boiling. If the respondents knew in 1922 that these particular couplings did not give dyes fast to the specification as specified examples and utilised the exhibits for the purposes of obtaining the patents it was a false suggestion and the consideration for the granting of the patents failed.

Mr. Whitehead, K.C. (for the respondents): Do you mean intentionally false suggestion?

Mr. Jacob: Certainly not. It is not part of my case to suggest that there was any intentional false suggestion. It was a false suggestion, and the fact that the examples were for printing does not excuse them. If the discovery was not made until last year that these couplings were not fast to kier boiling the patents were granted for purposes which they had not achieved.

Mr. Whitehead's Address

On Thursday, Mr. Whitehead, K.C., for the respondents, addressed the Court, and said that one of the points of construction that he asked his Lordship to put upon the first of the three specifications was one involving comparative rather than absolute properties when the Court had regard to the statements in the specification of the 1912 patents, and then to a more direct reference by way of specification in another paragraph of the same specification it was plain that the patentee was saying that he was offering a rule for the selection of coupling components which would give, if carried out, a series of dyes upon the fibre which would have such properties as fastness to kier boiling which would be greater than had been obtained before.

Another point of construction, said Mr. Whitehead, which he wished the Court to adopt, was this: They had here a claim, not for the bodies as bodies without reference to their properties, but a claim for a rule which, if followed out, would give rise to a selection of bodies which would be distinguished by their advantageous properties.

Dealing with the phrase "fastness to kier boiling," counsel argued that that phrase in the specification should not be read as an absolute term, but in relation to the prior knowledge of the art. It was not a definite promise that every dyestuff within the ambit of the specification would possess "excellent" fastness to their boiling. What was the relative prior art to be considered? His contention was that the fundamental consideration was: What was the purpose of kier boiling? It was not to obtain a dye, but to get a good white.

Every bleacher would desire to use a kier liquor to give him a good white, each liquor being as strong as the dyestuff would stand. The Court construing this reasonably, having regard to the art, might well consider that no dyestuff could be said to possess this quality of excellent fastness to kier boiling, unless it would stand a boiling in caustic soda. Then came the question: What strength of caustic soda and what length of boiling? He submitted that the proper and natural way of construing this promise was to say that the property of excellent fastness was the degree of concentration of caustic soda which would be useful, and for a time which would be useful in each case. It would be too stringent to say that all dyestuffs should be required to stand up to the same strength of liquor and for the same time.

His Lordship: There is no warning that "excellent fastness" means anything but excellent fastness to ordinary commercial kier boiling as known in the trade.

Mr. Whitehead said he agreed that the specification did not of itself indicate or give any warning that anything other than fastness to ordinary kier boiling was contemplated. Then the Court must be informed by evidence what ordinary kier boiling meant, and he submitted that it did not mean soda ash boiling, to which coloured goods were subjected.

The hearing is proceeding.

Port Pirie Smelters

Important Development in Lead Refinery Practice

In a recent address on the Port Pirie smelters, which he declared to be the greatest in the world, Mr. F. W. Reid, principal of the South Australian School of Mines, said there were other organisations, such as the American Smelting and Refining Co., of the United States, which controlled smelteries in different parts of the country, and so had a greater output in the aggregate, but the Port Pirie smelters had the greatest output of any single smelter. A steady stream of wealth, in the form of molten lead and silver, literally flowed through the refinery there at the rate of over 20 tons an hour, or 500 tons every 24 hours.

But tonnage was not the only criterion of greatness, and the Port Pirie smelter plant was leading the world at the present time, not only in output, but also in metallurgical practice.

A New Process

A new process, which was destined to be one of the greatest achievements of the Port Pirie smelters, was, said Mr. Reid, now being perfected, and would, in his opinion, revolutionise lead refinery practice throughout the world. Leading American smelters were now eagerly awaiting permission to send their metallurgists over to see the process in operation, with a view to its adoption in their own works. It related to the method of separating gold and silver from the lead, and converted what was an intermittent and rather involved process, requiring a great deal of labour, into one which was continuous and straightforward, requiring very little labour. It also greatly reduced the capital expenditure in plant. In every department the story was the same. From the beginning to the end of the treatment scheme the practice was at least equal to, and in several cases in advance of, anything to be found elsewhere. A point he particularly emphasised was that the metallurgical staff of that great smelter, which at the present time was leading the world's practice, was 100 per cent. Australian.

Chemical Trade Features

Use of Cellulose Lacquers

The annual meeting of the Chemical and Allied Trades Section of the Manchester Chamber of Commerce was held on Wednesday, and the report adopted, while indicating no general improvement in trade during 1929, refers to some interesting and satisfactory developments which have taken place. The report states that the effect of the rapidly increasing use of the so-called cellulose lacquers upon the chemical trade, both as to home manufacture and imports, is becoming more and more pronounced, and provides almost the one bright spot in the year's trade. Acetone, the butyl and other similar esters and various ketones used as solvents are providing constant additions to the list of chemicals, formerly known only in text-books, which are now substantial articles of commerce. Progress in the artificial resin and rubber industries is also, though to a smaller extent, contributing to this introduction of new items in trade price lists.

The section re-elected Mr. J. Allan as chairman, Mr. Forrest Hewit as vice-chairman, and Mr. A. Heywood as honorary secretary.

The Industrial Implications of Surface Chemistry

Dr. Rideal's Interesting Paper

A meeting of the Manchester Section of the Society of Chemical Industry was held on Friday, January 10, when a paper entitled : " Some Aspects of Surface Chemistry, and their Industrial Implications," was read by Dr. E. K. Rideal. Dr. R. H. Pickard, F.R.S., presided.

DR. RIDEAL said he wished to give a very brief review of the subjects which were being investigated at Cambridge, as regards their connection with present-day chemical industry. The first point to which he desired to draw attention was with regard to the nature of the surfaces of metals and their relationship to a great number of catalytic reactions. If, for example, alcohol was passed over a copper surface at a suitable temperature, aldehyde and hydrogen could be prepared, and the reverse reaction could also take place, namely, that aldehyde and hydrogen would form alcohol.

The points for consideration were what was the mechanism of those processes, what was taking place at the copper surface, and what was the nature of the copper surface ? If alcohol was passed over ordinary sheet copper practically nothing happened, but if the copper was oxidised and reduced a number of times at increasingly lower temperatures, until the copper oxidised quite readily upon exposure to air, the copper was activated and the activity of the copper catalyst was thousands of times greater than that of ordinary copper from the rolling mills. Furthermore, if, e.g., the nitrate salt was converted into hydroxide and reduced, a very active material was obtained.

Work of the Non-Ferrous Metals Research Association

It was thought that some insight into the matter might be obtained by studying a very simple reaction taking place with the copper itself, namely, the oxidation of copper, and considerable assistance had been obtained in this investigation through the help rendered by the Non-Ferrous Metals Research Association.

If a piece of metal was exposed to the air, and heated up to a sufficiently high temperature, temper colours were obtained, and the growth of the oxide film could be observed upon its surface. At first, this oxide film was so thin that it could not be seen at all, but it gradually became thicker until Newton's interference colours were apparent. From the colour observed, information could be obtained as to the thickness of the film. Copper behaved in a similar manner, and it was now known that the rate of growth of the oxide film followed the ordinary parabolic law, and that the square of the thickness was proportional to the time, i.e., as the oxide film became thicker the oxygen on the surface diffused through the oxide layer and attacked the metal underneath. This had been shown to be the fact by Pilling and Bedworth in the case of copper, and had been confirmed by Dunn for temperatures over 600° C. At lower temperatures the parabolic law was not obeyed, the copper behaving in a most erratic manner. This position was the starting point of an investigation carried out during the past four years. The consideration of the mechanism of the oxidation of copper at relatively low temperatures was, therefore, an interesting problem.

Oxidation of Copper

It was perfectly clear that if there was no oxygen present there would be no oxidation ; it was also very clear that at high temperatures the oxidation of copper obeyed the ordinary parabolic law. In the literature there was found to be great diversity as to the so-called critical pressures at which the parabolic law was obeyed, some people recording 7 m.m. and others 120 m.m.

In investigating the oxidation of copper at low temperatures and at low pressures, it was found that the rate of reaction was proportional to the pressure. If a massive piece of copper was examined under the microscope it would be seen to be composed of a certain number of crystals and that in between each crystal there were slip planes. Actually, it had been shown by Smekal that this was not merely true for a metal but also for any crystalline substance. For instance, sodium chloride did not consist of a uniform crystal, but was built up of small blocks of sodium chloride ; there was a certain amount of surface energy which was tending to contract the surface. The result was that the surface broke, and a great number of small elementary units were obtained, while in between there were slip planes or Smekal cracks.

In a piece of ordinary copper the grain size was relatively large, so that there were very few Smekal cracks on the surface. The investigations of Wilkins showed that the oxygen, upon striking the surface, diffused laterally, passing down the slip planes. The mechanism of the diffusion of oxygen at high temperature was thus different from the diffusion of oxygen at low temperatures, because at high temperatures the oxygen diffused through the solid space lattice of the copper oxide.

It could now quite readily be understood why varying values of the critical pressure had been found by different observers. In the case of a very active form of copper, which was found by microscopical examination to possess a reduced grain size, the number of Smekal cracks was increased, and the oxygen striking the surface diffused through them. Therefore, the pressure had to be higher in order to saturate an active surface, in which there were more holes per square inch than in machine copper.

It might be imagined that surface catalysis did not take place between the two reactants coming into adjacent squares, but that both were adsorbed on the surface and were not fixed but moving about as two-dimensional gases, and that when, say, an ethylene molecule and a hydrogen molecule struck one another with sufficient energy at the proper place on the surface, then combination might be considered to take place. The efficiency of a catalyst, it was imagined, was greatly increased by this conception of two-dimensional gases as opposed to the view of Langmuir of contact at adjacent squares.

Thermionic Emitters

In connection with the manufacture of thermionic emitters, in which thin films of barium oxide on a tungsten surface were used, the mechanism of the emission of the electron from barium oxide-coated tungsten was that the barium atom lost an electron and became a positive bariun ion. This barium ion had to return to the tungsten surface in order to collect its electron and become a barium atom, or, if regarded in another way, the electrons travelled by means of electrolytic action, but the neutralisation of the surface charge had to take place by the travelling of the ion along the slip plane of the barium oxide.

In other words, the most effective emitter was not a tungsten one covered with, say, one large crystal of barium oxide, but a tungsten surface covered with a great number of small crystals of barium oxide, so that the barium ions would readily travel down along the slip planes of the material. This surface mobility had also been demonstrated by Becker in regard to a platinum surface, who showed that barium moved about as a two-dimensional gas over the platinum.

Frankenburger, in Germany, and Wansborough Jones, in Cambridge, had commenced certain experiments from the opposite end of the process, the former using an iron wire in hydrogen while the latter used a platinum wire in nitrogen at low pressures, the wires being suspended in loop form and the containing glass vessel being surrounded by liquid air. Owing to the low temperature of the liquid air every atom of metal which struck the glass stuck to it. Wansborough Jones found that for every atom of platinum which was vaporised from the platinum wire and was deposited upon the glass one molecule of nitrogen disappeared from the gas.

Fatty Acid Films

Dr. Rideal concluded his paper by a reference to some interesting experiments which had been made with regard to the surfaces of liquids covered with films of fatty acids, such as palmitic acid conveniently dissolved in benzene, showing that in alkaline conditions solution of part of the film occurred, but that the remainder of the film ceased to go into solution in the liquid ; apparently that portion which had already been dissolved prevented it from doing so. The stability of surfaces spread out upon the surface of water depended very much upon the adhesions of the polar group to the water, and a method was described for determining the effective electric moments of adsorbed molecules.

The Polymerisation of Drying Oils

A Paper Before the Oil and Colour Chemists' Association

Dr. J. J. Fox presided at a meeting of the Oil and Colour Chemists' Association on Thursday, January 9, at the Institute of Chemistry, London, when Dr. J. O. Cutter read a paper on "The Polymerisation of Drying Oils."

DR. CUTTER, in opening his paper, stated that he intended limiting his remarks to the changes that occurred in linseed and tung oils upon heating. The effects of added materials such as oxygen or sulphur would not be considered. He would discuss in some detail the properties of the oils in the liquid state, as practically the whole of the experimental evidence was based upon these properties, and therefore it was of primary importance to examine carefully the premises upon which such tests were made.

Dr. Cutter then proceeded to review the knowledge available to-day concerning the compositions of linseed oil and tung oil, afterwards considering in some detail two theories of polymerisation which had been put forward to explain the changes which were observed. The two theories chosen were Salway's, which was considered by Dr. Cutter as representative of chemical school of thought, and, secondly, Wolff's, in which an entirely new line of thought occurred, and which was usually considered representative of those workers who believed that the change was a colloidal one.

The Properties of Oils

It was now necessary, he stated, to examine the properties of oils in order to decide whether any of these theories fitted the facts He proposed to examine these properties under the headings of (*a*) hydrogenation, (*b*) viscosity, (*c*) dispersion of oils in other liquids, and (*d*) X-ray examination (viscosity, dispersion and X-ray examination being properties of the liquid state).

In 1926 K. H. Baumer polymerised α- and β-elaeostearic acid, and then hydrogenated the polymerised products. Bauer obtained from the polymerised α-acid practically a quantitative yield of stearic acid, while the polymerised β-acid gave an unidentifiable oil. This evidence, although not conclusive, was a real advance in the understanding of the subject. Later Greth, working with Eibner, prepared linseed oil stand oils and carefully hydrogenated them, obtaining a high yield of stearic acid glyceride; nevertheless, a small quantity of unhydrogenated residue always remained. This evidence strongly supported Wolff's theory that the change in a heated oil was due to extra-molecular polymerisation.

General Properties of Liquids

Dr. Cutter then considered the general properties of liquids. Every investigator realised that liquids might be divided into two classes, normal and abnormal. Water was an excellent example of an abnormal liquid. It was a good solvent, the ideal ionising medium, and was undoubtedly polymerised, the double molecule $(H_2O)_2$ existing even in the vapour. The paraffins on the other hand were normal liquids; they were poor solvents, inert, lacked ionising power, and showed well-ordered changes in properties in homologous series. The alcohols, weak acids, esters, ketones and the benzene hydrocarbons showed lesser degrees of abnormality, gradually approaching the paraffins in normality.

The properties of mixtures of liquids were very interesting. It was nearly always possible to predict the properties of a mixture of normal liquids, but this was impossible in the case of admixtures containing abnormal liquids. Again, it was not possible to define the degree of abnormality of liquids, although many methods of measuring it were available. The only conclusion to be drawn was that we were dealing with "chemical affinity," and it was this chemical affinity that caused abnormality. Many examples of normal and abnormal behaviour were quoted, amongst them being the facts that alcohol and ether were non-solvents for nitrocellulose, while a mixture of these two liquids dispersed nitrocellulose easily. It could only be concluded that the alcohol (abnormal liquid) and the ether (normal liquid) had combined, forming a new compound, which acted as the dispersing medium for the nitrocellulose.

It could be said generally that if two abnormal polymerised liquids A and B were mixed, then the general tendency was for A and B to dissociate and recombine forming new associates, or to polymerise, forming $(AB)_n$. These general principles could be directly applied to the properties of oils as observed by various investigators, since the observed facts upon which many theories had been based were obtained from the properties of oils dispersed in liquids.

Dr. Cutter then discussed the determinations of molecular weights in the light of the above views. Molecular weights of thickened oils (or to be strictly accurate, the number of molecules produced from a definite weight of solute) determined in normal solvents, say benzene or chloroform, varied very rapidly with concentration, but if the solvent was an abnormal one, say, stearic acid, then results reasonably independent of concentration were obtained. Upon the above views those results were simply explained. The abnormal or associated solvent stearic acid, upon admixture with a heated or bodied oil, dissociated, as also did the oil; therefore normal molecular weight results were obtained. On the other hand, the normal liquid did not assist dissociation, and, therefore, the molecular weight results depended largely upon the concentration of the oil.

Explanation of Variable Results

The very variable iodine values that could be obtained from bodied oils (Morrell pointed this out some years ago) could also be simply explained upon this hypothesis, *i.e.*, the oil, an associated liquid, dissociated to different extents in different liquids, and therefore showed a variable iodine value which was dependent upon the condition of determination. A similar explanation could be given of the variable results obtained by different investigators in extraction of oils by various solvents: here again the abnormal solvent caused a dissociation of the oil (cf. Auer, *Kolloid-Zeitschrift*, 1927, Vol. 42, 288), while the more normal solvents, say acetone, by repeated extraction gradually approached a condition of equilibrium, but never reached it. It was noteworthy in this respect that an oil did not possess a defined solubility, but the quantity taken up by a liquid was only a function of the conditions under which it was determined.

Conclusions

The conclusions that could be drawn were reasonably clear, said Dr. Cutter finally. The synthesis of the glycerides in linseed and tung oils, and the determination of their properties, was very desirable, but our knowledge of the possible glycerides and the methods of synthesis of these compounds was very small. By the examination of synthetic materials, we might be able to obtain a knowledge of the mechanism by which extra-molecular polymerisation took place when oils were heated. It was unnecessary to use the word colloid in respect of oils, since the primary assumption that a bodied oil was an associated liquid explained the facts, although it remained to be seen whether this hypothesis would withstand a quantitative analysis.

Mr. G. M. Hamilton gave an outline of the present state of knowledge of the possibilities of synthesis of the glycerides in linseed and tung oils.

Discussion

Dr. L. A. Jordan (Director of the Paint and Varnish Research Association) said that the subject of the polymerisation of drying oils was one of the eternities of oil chemistry, and had exercised the minds of generations of chemists. It was the art of the varnish and paint maker so to balance and adjust the components of the system they built up, that abnormality arising from internal conditions was at a minimum; thus the effect of the use of oils subjected to different treatments, whether by heat or oxidation or both, was a most important factor in the technique of the manufacturing operations, as well as in the more obvious external conditions which operated on the drying of the products in use. Dr. Cutter had used the word "polymerisation" in a general sense, meaning the thickening of oil by heat.

Frequently, thickening of oil was looked upon as the counter part of an oxidation process, but recently there had been a growing appreciation of the part played by condensation processes, involving the elimination of water and polymerisation of a more vague character.

Welding in Chemical Engineering

Chemical Engineering Group Discussion

The more recent developments in methods of joining metals are based upon the ability to produce and control temperatures ranging from 2,000° to 3,500° C. The successful application of these high temperatures has been attended by remarkable extensions in the field of fusion welding. The subject was discussed by Mr. J. R. Booer at a meeting of the Chemical Engineering Group at Burlington House, London, on Friday, January 10, in a paper entitled "Welding in Chemical Engineering."

THE most important sources of heat, said Mr. Booer, are the oxy-acetylene flame and the electric arc. The appearance of, and conditions in, the oxy-acetylene flame vary considerably according to the proportions of the two gases. The normal welding flame contains a slight excess of acetylene, but under certain conditions use is made of flames containing excess either of oxygen or of acetylene.

The electric arc, properly protected, can be regarded as a neutral source of heat. Both carbon and metal arcs are employed, and with direct current the usual procedure regarding polarity is to make the work positive. Alternating arcs with metal electrodes are also in considerable use. The average temperature of the metallic arc is considered to be about 3,500° C. A recent modification of the arc is the atomic hydrogen process in which a stream of hydrogen is passed through a tungsten arc.

Physical Considerations

By far the most important of the physical effects are those of expansion and contraction occasioned by the relatively immense temperature variations, and which, unless adequately dealt with, can result in serious deformation or stresses localised in the vicinity of the weld.

Conductivity is another important factor which affects the cost and speed of welding. It is on account of its high conductivity that copper requires the same power oxy-acetylene blowpipe as steel of identical thickness, in spite of the much lower melting point of copper. Surface tension plays its part in the homogeneity of the weld. Volatilisation of metals is an important effect in welding certain alloys such as brass.

Chemical Considerations

The fundamental chemical principle involved is that of oxidation and reduction, the chief considerations being the formation of metallic oxides. One of the direct effects of oxidation is the loss of carbon, manganese, and silicon as oxides during the welding of iron and steel. It is both impossible and unnecessary in this paper to detail the effect of variations of the carbon, manganese, and silicon contents in iron and steel, but it must be remembered that all these elements are easy to oxidise.

Another very important chemical consideration is that of the purity of the metals, gases, and other agents used, and the points which arise may be enumerated as follows:—(1) That it is impossible to produce good welds on unsatisfactory base metal or with unsuitable welding rods; (2) that it is costly, and in certain cases impossible, to produce good welds with impure gases; (3) that it is very difficult, and in some instances utterly impossible, to produce good welds with impure or inactive fluxes.

Purity of Acetylene

The purity of acetylene is an important factor. As generated from calcium carbide it contains heavy traces of hydrogen sulphide and phosphine, which are readily detected by exposing a moist silver nitrate paper to the gas. Exposure for five seconds should produce no visible stain. The importance of pure acetylene arises from the fact tht sulphur and phosphorus are almost quantitatively transferred to the weld. Impure acetylene is unusual in cylinders, but where generators are used an efficient purifier must be employed and a constant watch kept on the quality of the gas.

Weldability

The quality of the base metal or work has a profound influence on the quality of the weld, and it is now being realised that there is considerable variation in the suitability for welding in various specimens of the same commercial metal. In the following table, abstracted from the *Revue de la Soudure, Autogène*, the results are expressed numerically, o signifying that the metal is unweldable and 10 that absolutely perfect welds were obtained.

Material.	Weldability Factor. Normal Method.	Special Method.
Steel, very mild carbon 0—0·15% ..	9	9·5
,, mild ,, 0·15—0·25% ..	8·5	9·5
,, medium ,, 0·25—0·40% ..	6	7·5
,, medium ,, 0·40—0·60% ..	4	5·5
,, hard ,, 0·60—0·70% ..	2	4
,, hard ,, 0·70—1·0% ..	1	8
Steel castings ,, about 0·4% ..	7	8
Nickel steel, low ,, 2—3% nickel .	5—6	6—7
Grey cast iron	9	10
Malleable cast iron	2—6	4—7
Copper	5—10	5—10
Brasses	5	9
Bronzes	5	9
Aluminium	9	10
Aluminium castings, various compositions	10	—
Duralumin	6	8
Nickel	0—6	2—8
Monel metal	5	7
Zinc	7	9
Lead	10	10
Magnesium	7	8

A summary of the behaviour of the principal metals will be of interest.

Aluminium and Its Alloys

By the oxy-acetylene process excellent welds on all thicknesses of aluminium are obtainable by skilled workers provided the metal has good weldability and a highly active flux is used. The alloys of aluminium can be welded satisfactorily with a suitable rod and correct welding procedure. Both high- and low-percentage aluminium bronzes give good oxy-acetylene welds provided a highly active flux of the aluminium type is used. Duralumin does not give good welds.

Nearly all commercial copper is unsuitable for welding, and weldability tests are therefore essential. On weldable copper, good welds are obtainable with correct welding procedure. The welding of brasses can be carried out successfully by all processes. In oxy-acetylene welding, however, an important variation of the usual procedure is needed. The flame should be regulated to be distinctly oxidising. Bronzes generally give good welds by all processes. One of the most important from the chemical engineering point of view is phosphor bronze. This alloy seldom contains more than 1 per cent. of phosphorus, and gives good welds if a rod of suitable composition is used. The welds should possess resistance to corrosion quite equal to that of the original metal.

Chromium and Chromium Steels

Owing to the rapidity with which it oxidises at high temperatures and the high melting point of the oxide, chromium presents numerous difficulties. However, chrome steels are quite weldable provided the percentage of carbon is not sufficiently high to introduce troubles.

Chromium steels are of particular interest to the chemical engineer on account of their resistance to corrosion. To preserve this property it is of the utmost importance that the chemical and physical properties of the deposited metal shall be identical to those of the original, and this demands careful selection of welding rods. Recent work on welding "stainless steel" has resulted in the development of special welding rods.

In most cases excellent welds can be obtained on cast iron by the oxy-acetylene process if certain precautions are ob-

served. Acid-resisting cast irons usually contain a high percentage of silicon, and are brittle and extremely weak at high temperatures. They are consequently very difficult to weld, especially if the casting is intricate. Owing to the internal variation of its carbon content, autogenous welding of malleable iron is not recommended. Brazing or "bronze welding," as it is called, is to be preferred. The procedure generally adopted for wrought iron is the same as for mild steel.

By the oxy-acetylene process excellent welds on mild steel are obtainable provided the metal has good weldability and the rod is of the highest standard of purity. The arc process gives exceptionally fine results.

As regards medium and high carbon steels, those containing more than 0·4 per cent. of carbon are very difficult to weld satisfactorily by any process.

"Lead burning" with the oxy-hydrogen flame is too familiar to need description, and is, of course, an excellent example of autogenous welding.

Monel Metal and Nickel

Monel metal can be satisfactorily welded by most processes, and provided good penetration is obtained the resistance to corrosion is not impaired. Special precautions are necessary.

Until quite recently the welding of nickel was regarded as impossible, and it was always stated that the lack of weldability was due to the absorption of gases. The work of the French Welding Association has shown that this is not so and that the failure of nickel welds is due to the formation of the nickel-sulphur eutectic Ni_3S_2 during welding. Before welding, manganese and sulphur which may be present in traces are combined, but as the former element is easily oxidised, the operation of welding causes the formation of Ni_3S_2, which is almost insoluble in nickel. Oxy-acetylene welding has been made possible by the use of a special flux, the active ingredients of which is manganese, and the effect of which is to prevent the decomposition of manganese sulphide.

If necessary, zinc can be welded with complete success by the oxy-acetylene process. Bi-metals such as galvanised and tinned iron cannot be satisfactorily welded, unless suitably treated.

Discussion

Mr. J. ARTHUR REAVELL (president of the Institution of Chemical Engineers, and formerly chairman of the group), agreed with Mr. Booer that the training of the operator was of the utmost importance, because much work was spoiled merely because operators lacked proper training. He would have liked to have heard more as to the circumstances of the operations for which it was best to use acetylene welding, coal gas welding or electric welding, because that was a matter which affected chemical engineers very materially. For instance, caustic soda was used very largely in the chemical industry; indeed, he believed that in that industry it was the most largely used substance after water.

It was his experience that for the construction of vessels in which caustic soda was to be used, and particularly vessels in which it was to be used under pressure, acetylene welding was of no use at all; that with electric welding much better results could be obtained; and that in order to secure the very best results, coal gas welding should be used.

Welding for Caustic Soda Vessels

He had built boilers in which he had concentrated caustic soda from 15° Twaddell to 25° Twaddell, producing steam at 80 lb. pressure, using the steam in the works and passing the soda on to evaporators for concentration. Such an installation had been at work for 10 or 12 years to his knowledge. The first attempts to make such plant had failed completely, because acetylene welding was used. Then electric welding was resorted to, but at that time the state of its development was such that its application to this work was unsuccessful. Coal gas welding had proved to be successful, however, and was still successfully used for the construction of vessels for using caustic soda under those conditions.

Commenting on Mr. Booer's reference to the advances made in America, he said he wondered whether their American friends had constructed a chrome steel vessel 6 ft. in diameter which would stand a jacket working at 300° C. of welded mild steel to chrome steel, with 28½ in. vacuum inside and a stirrer, working with acetic acid. Six or eight such vessels had been working in England for a considerable time without showing any signs of corrosion, and if such had been made in America he would like to hear about them. When he heard fairy tales about greater progress having been made in other countries than in this, he was tempted to ask with what success thay had been able to weld mild steel to chrome steel. We in England were doing these things regularly.

Tank Welding

Mr. F. H. ROGERS (a former chairman of the Group) said that if an engineer were constructing a tank of large dimensions he would rivet it, but it was suggested in the paper, more or less, that he should weld it. Therefore, it would be helpful if Mr. Booer could give some figures as to the strengths obtained in a mild steel plate welded end-to-end, and in steel plates butt welded and lap welded. (Replying at the end of the discussion, Mr. Booer said that the average strength of an arc weld on mild steel was of the order of 30-35 tons per sq. in.—tensile.)

Dr. W. R. ORMANDY, after expressing gratitude to Mr. Booer for having drawn attention to a subject of growing importance, recalled that some six or seven years ago, in a German works which he had visited, where they were carrying out operations under a pressure of 1½ tons per square inch, he had been astonished to find that the cutting of a hole in an autoclave, the fitting of a branch pipe and the welding on of a cooler, and so on, was regarded as an everyday operation.

Acid-Resisting Cast Irons

Mr. S. J. TUNGAY said he had spent a lot of money in an endeavour to weld acid-resisting cast irons satisfactorily. As Mr. Booer had stated, these irons possessed a high percentage of silicon, and were brittle and extremely weak at high temperatures; consequently they were difficult to weld, especially if the castings were intricate. He had tried all possible methods, including the use of a welding rod high in silicon, the preheating of the casting, and the supporting of the parts to be welded (to avoid sagging and fracture during welding). So far these rather expensive experiments had failed to achieve the object in view.

Inspection of Lyons' Laboratories

Visit by Members of the Institute of Chemistry

ON Wednesday, members of the London and South Eastern Counties Section of the Institute of Chemistry paid a visit to the bakeries and laboratories of J. Lyons and Co., Ltd., in Hammersmith Road, London. The party visiting the bakeries assembled early in the afternoon, returning later to the laboratories, where they were joined by a further party, the number of visitors totalling 120. After tea, the visitors separated into small groups, and were conducted over the various departments, in which the members of the staff were engaged in their normal duties. Among the departments visited were the research laboratories, the constant temperature rooms, the physico-chemical laboratories, the dark room, the bakery products technical laboratory, the general laboratory, the cocoa products technical laboratory, etc. In spite of the size of the party, the arrangements were carried out by the firm with their customary efficiency, and the keen interest of the visitors was shown by the large number of questions addressed to the members of the staff who were detailed to describe the work in progress. The laboratories have already been described in these columns (see THE CHEMICAL AGE, March 16, 1929, pp. 246–247).

New Benn Books

AMONG the new books announced for early publication by Ernest Benn, Ltd., are the following:—*Electrical Trades Directory and Handbook*, 1930 (25s.); *Encyclopædia of the Ceramic Industries*, Volume II, by A. B. Searle (9 guineas the set of 3 volumes); *Mr. Lloyd George: A Study*, by Sir Charles Mallet (9s.); *Rothamstead Conference Report*, No. 10. The Growth of Cheap Winter Food for Livestock (2s. 6d.).

The "Affirmations Series," published at 1s. each, includes the following new titles:—*The Way to World Peace*, by H. G. Wells; *The Reality of a Spiritual World*, by Sir Oliver Lodge; *Fear and Religion*, by the Rev. Geoffrey H. Woolley; *The Escape from Idolatry*, by Dr. Percy Dearmer; *Institutional Religion*, by J. C. Hardwick; *The Law of Self-Sacrifice*, by W. J. Blyton.

Great Increase in Chemical Export Trade

Year Ends on Favourable Note

THE Board of Trade Returns for December, 1929, indicate that imports of chemicals, drugs, dyes and colours for that month were valued at £1,491,181 (an increase of £215,365 on December, 1928), exports at £2,577,918 (an increase of £547,486), and re-exports at £80,915 (an increase of £5,334). For the year 1929, imports were valued at £16,865,995 (an increase of £1,486,038), exports at £26,625,924 (an increase of £1,215,681), and re-exports at £958,653 (a decrease of £62,042). The details are as follows :—

Imports

	Quantities Month ended December 31,		Value Month ended December 31,	
CHEMICAL MANUFACTURES AND PRODUCTS—	1928.	1929.	1928.	1929.
			£	£
Acid Acetic .....tons	975	2,236	39,623	80,599
Acid Tartaric .....cwt.	1,750	2,517	10,736	17,394
Bleaching Materials ,,	11,400	11,710	9,088	15,644
Borax..... ,,	21,266	39,787	13,988	24,053
Calcium Carbide ... ,,	104,545	114,122	64,573	64,581
Coal Tar Products value	—	—	13,741	95,035
Glycerine, Crude .. cwt.	500	101	1,000	200
Glycerine, Distilled ,,	352	796	1,052	1,778
Red Lead and Orange Lead ..... cwt.	3,443	3,559	4,246	5,511
Nickel Oxide ..... ,,	78	87	367	477
Potassium Nitrate (Saltpetre) .....cwt.	7,618	14,413	7,660	14,180
Other Potassium Compounds .....cwt.	315,416	254,443	102,260	75,075
Sodium Nitrate .... ,,	195,740	79,822	100,591	35,699
Other Sodium Compounds .....cwt.	47,902	42,641	38,594	27,642
Tartar, Cream of ... ,,	3,264	2,810	13,669	13,867
Zinc Oxide ..... tons	878	983	25,315	27,847
All other Sorts....value	—	—	271,289	313,113
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....ozs.	103,411	175,626	7,838	11,832
Bark Cinchona, etc. cwt.	1,760	1,981	6,172	9,114
Other Sorts .....value	—	—	187,106	272,189
DYES AND DYESTUFFS—				
Intermediate Coal Tar Products .....cwt.	10	203	102	2,255
Alizarine ..... ,,	29	172	1,058	5,609
Indigo, Synthetic... ,,	—	—	—	—
Other Dyestuffs ... ,,	4,102	4,001	93,742	84,159
Cutch ..... ,,	2,878	2,473	4,313	4,081
Other Dyeing Extracts cwt.	2,356	3,599	9,376	10,888
Indigo, Natural .... ,,	24	27	600	715
Extracts for Tanning ,,	91,194	92,950	100,128	93,600
PAINTERS' COLOURS AND MATERIALS—				
Barytes, ground, and Blanc Fixe ..... cwt.	65,414	58,525	14,177	12,775
White Lead (dry) .. ,,	12,821	17,141	20,860	30,711
All other Sorts .... ,,	80,516	104,925	112,552	140,558
Total of Chemicals, Drugs, Dyes, and Colours ..... value	—	—	1,275,816	1,491,181

Exports

CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid Sulphuric ....cwt.	7,555	8,608	3,917	4,116
Acid Tartaric ..... ,,	1,765	2,234	12,716	16,987
Ammonium Chloride (Muriate) .....tons	199	286	4,383	6,222
Ammonium Sulphate—				
To Spain and Canaries tons	10,118	26,029	97,597	238,858
,, Italy ..... ,,	616	598	5,785	5,479
,, Dutch East Indies tons	2,835	13,133	28,596	125,337
,, Japan..... ,,	4,758	18,517	46,607	174,302
,, British West India Islands and British Guiana tons	446	205	4,396	1,817
,, Other Countries ,,	14,030	30,557	138,034	284,945
Total ..... ,,	32,803	89,039	321,015	830,738
Bleaching Powder (Chloride of Lime) .....cwt.	58,813	80,227	16,810	19,560
COAL TAR PRODUCTS—				
Anthracene .....cwt.	120	—	94	—
Benzol and Toluol..gals	260,347	20,888	19,120	2,846
Carbolic Acid ..... cwt.	15,148	19,726	24,852	28,860
Naphtha.....galls.	4,937	2,458	623	325
Naphthalene (excluding Naphthalene Oil) cwt.	4,316	9,066	1,723	3,177
Tar Oil, Creosote Oil, etc.....galls.	5,494,895	5,120,563	176,520	120,668
Other Sorts .....cwt.	51,532	30,282	31,678	21,687
Total.....value	—	—	254,610	177,563
Copper, Sulphate of ..tons	2,431	2,588	58,124	60,066
Disinfectants, Insecticides, etc. .....cwt.	35,800	39,801	86,613	92,725
Glycerine, Crude .... cwt.	1,196	2,024	1,701	3,221
Glycerine, Distilled ... ,,	9,533	13,488	30,339	34,831
Total ..... ,,	10,729	15,512	32,040	38,052
POTASSIUM COMPOUNDS—				
Chromate and Bi-chromate ..... cwt.	2,484	1,157	4,568	2,323
Nitrate (Saltpetre) . ,,	1,409	1,261	2,676	2,354
All other Sorts .... ,,	2,070	1,828	12,133	11,534
Total ..... ,,	5,963	4,246	19,377	16,211
SODIUM COMPOUNDS—				
Carbonate, including Soda Crystals, Soda Ash and Bicarbonate cwt.	278,348	443,853	81,831	114,639
Caustic ..... ,,	101,700	147,788	75,068	94,194
Chromate and Bi-chromate ..... cwt.	3,202	3,088	4,445	5,006
Sulphate, including Salt Cake .....cwt.	97,934	331,292	11,377	35,297
All other Sorts .... ,,	53,853	55,192	89,960	75,778
Total ..... ,,	535,037	981,213	262,681	324,914
Zinc Oxide ..... tons	92	207	3,725	7,112
Chemical Manufactures, etc. (all other Sorts) value	—	—	308,725	324,127
Total of Chemical Manufactures and Products ..value	—	—	1,384,736	1,918,393
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .....oz.	145,297	166,014	14,378	16,607
All other Sorts....value	—	—	253,245	270,620
Total ..... ,,	—	—	267,623	287,227
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	7,149	9,289	54,000	64,962
Other Sorts ..... ,,	7,992	9,759	6,727	9,462
Total ..... ,,	15,141	19,048	60,727	74,424
PAINTERS' COLOURS AND MATERIALS—				
Barytes, ground, and Blanc Fixe ..... cwt.	2,805	4,568	1,169	2,588
White Lead (dry) .. ,,	3,362	4,131	7,159	8,222
Paints and Colours in paste form ..... cwt.	44,137	36,403	86,652	71,761
Paints and Enamels Prepared (including Ready Mixed)..... cwt.	39,456	39,691	133,463	130,531
All other Sorts .... ,,	46,372	45,355	88,903	84,772
Total..... ,,	136,132	130,148	317,346	297,874
Total of Chemicals, Drugs, Dyes and Colours ...value	—	—	2,030,432	2,577,918

Re-Exports

Chemical Manufactures and Products—	Quantities Month ended December 31, 1928.	Quantities Month ended December 31, 1929.	Value Month ended December 31, 1928.	Value Month ended December 31, 1929.
Acid Tartaric ..... cwt.	89	36	741	314
Borax ..... ,,	420	8	406	6
Coal Tar Products. value	—	—	343	13,609
Potassium Nitrate (Saltpetre) .....cwt.	2,369	2,179	2,076	2,038
Sodium Nitrate .... ,,	11,122	692	5,562	346
Tartar, Cream of ... ,,	481	566	2,325	2,864
All other Sorts ...value	—	—	10,618	17,431
Drugs, Medicines, etc.—				
Quinine and Quinine Salts .....oz.	11,455	19,920	1,174	2,234
Bark, Cinchona, etc. cwt.	298	236	1,534	1,651
All other Sorts ...value	—	—	42,364	29,256
Dyes and Dyestuffs—				
Cutch .....cwt.	724	520	1,039	824
Other Dyeing Extracts cwt.	306	243	1,951	1,872
Indigo, Natural ... ,,	30	26	1,007	665
Extracts for Tanning (solid or liquid) . cwt.	661	668	973	920
Painters' Colours and Materials .....cwt.	1,800	1,359	2,986	6,662
Total of Chemicals, Drugs, Dyes and Colours .... cwt.	—	—	75,581	80,915

Relations of Engineer and Chemist

Mr. T. Roland Wollaston, speaking at the Manchester Athenæum last week on recent development in steam generation, said that it might savour of impertinence to criticise the Lancashire boiler, but in the course of a lifetime's experience he had learned some of its bad features. "We British engineers," he said, "are overwhelmingly conceited as a class. We are accustomed to think that we have taught all the world engineering." In a measure that thought was justified, since they certainly did set the ball rolling. Latterly, however, they had fallen behind. They were more conservative and self-satisfied than the engineers of some other nations; not willing to grasp the fact that other nations had in some branches of applied science gone ahead of them. Not the least important of those branches was the study of combustion and fuel chemistry in its practical application. They had available as good chemists and physicists as any country in the world, but as practical engineers they had failed grievously to apply the results of their teaching. There was no reason why engineers and chemists should not, more sympathetically, collaborate here, as they appeared to do elsewhere.

Plant for Utilising Animal By-Products

A catalogue entitled "Plant for the Utilisation of Animal By-Products" has been issued by George Scott and Son (London) Ltd., of Bradfield Road, Silvertown, London, E.16; the catalogue is under the name of their associated company, Ernest Scott and Co., Ltd., as it is under this name they have built a reputation in this trade. The catalogue deals with vacuum melting or rendering plant for edible fat, lard or tallow; complete plants for the production of oleo margarine or Premier Jus; vacuum dry steam rendering and centrifugal fat extractor installations; centrifugal fat extractors; vacuum digesting plant; vacuum evaporators; vacuum dryers for blood, tankage, etc.; solvent extraction plant for bones; solvent extraction plant; glycerine plant; soap and glycerine plant, etc. It is hardly necessary to add that the above list represents only one phase of the numerous activities of George Scott and Son.

Progress of the Whaling Industry

A catch of whales producing 136,080 barrels of oil, valued at over £567,000, is reported for the first twelve weeks of the 1929–30 Antarctic season, ended January 13, by Anglo-Norwegian Holdings, Ltd., the largest British unit in the whaling industry, for the fleets it controls. During the same period last year, 119,100 barrels of oil, valued at £496,250, were produced. The *Polar Chief*, the largest factory ship in the fleet, has not been producing for the last three weeks owing to coaling operations.

Lord Melchett's Visit to S. Africa

Opportunities for Trade Development

Lord Melchett, chairman of Imperial Chemical Industries, Ltd., left London last week for South Africa, where he intends to examine the possibilities of the distillation of oil and petrol from coal, and also to discuss with agriculturists and others the subject of economic unity in the Empire. He will visit Cape Town, Johannesburg and Durban in the course of his tour, and expects to return to London about the end of March.

Before leaving, Lord Melchett made a statement in which he explained that he was visiting South Africa largely on business, partly as a holiday, and also to extend his knowledge of the British Empire. Imperial Chemical Industries had large interests in conjunction with the De Beers Company and with African Explosives and Industries, and he intended to visit a number of factories where important developments were taking place and to study the extension of the explosives business. Those companies and Imperial Chemical Industries were interested to some extent in the question of fertilisers. He intended to give attention to the possibility of applying a process on which Imperial Chemical Industries were engaged for the distillation of oil and petrol from coal. South Africa possessed large quantities of cheap coal and no natural fuel oil. It was of special importance to the British Empire to neglect no potential sources of supply of oil fuel.

"I shall no doubt be asked," Lord Melchett proceeded, "to say something on the question of inter-Empire economic unity. I am staying with Sir Abe Bailey, who is a great believer in, and advocate of, this cause. I believe he is arranging two or three gatherings for me at the important centres in order that I may put forward our ideas on the crusade, also to enable me to learn the views of those engaged in South African agriculture and other enterprises of various kinds, who must be interested in a scheme of this character. I want, if possible, to go into Rhodesia, the future development of which is very important from the agricultural and mineral point of view. British manufacturers must extend their operations; we have much to give, and we can offer substantial help in the technical and commercial upbuilding of industries throughout the Empire."

Research as a Career

Mr. H. T. Tizard, Rector of the Imperial College of Science and Technology, in welcoming the 13th annual conference of the Science Masters' Association at the College, said that in the last eight years he had met many young men who were taking up a career of scientific research. Most of them came from the universities with a First Class, and a smaller percentage with a Second Class. Therefore they had high credentials and, generally speaking, their scientific knowledge was extraordinarily good. But the great bulk of them showed a distinct lack of general education, particularly an inability to express themselves properly in English, or—which was more alarming—to take any pride in doing so. He had known men with a First Class at a university who had had to be sent away from their occupation at the Department of Scientific and Industrial Research because they were incapable of making a clear report of what they were doing. Many of these young men seemed to think that the occupation of trying to apply scientific knowledge was something degrading and ignoble, and only to be done by men who could not do anything else. That was a great disadvantage to the country.

New Fertilisers

The production of the new Montansaltpeter DAVV, by the Gasverarbeitung Aktiengesellschaft (Mont Cenis process) at Herne/Westphalia, an ammonium sulphate-nitrate comparable to the I.G.'s Leunasaltpeter, amounted to about 20,000 tons by the end of December, 1928. This product has 26 per cent. nitrogen content. Another new fertiliser, ammonia-chalk (Kalkammon) DAVV, with 17 per cent. of nitrogen and 30 per cent. of limestone appeared in January, 1928, produced by the Ruhrchemie Aktiengesellschaft (Casale process), who mix ammonium chloride and calcium carbonate. The process does not use hydrochloric acid, but subjects ammonia, carbon dioxide, and calcium chloride to a reaction to produce ammonium chloride and calcium carbonate, thus working in a manner somewhat similar to the process producing ammonium sulphate with gypsum instead of sulphuric acid.

A Bookman's Column

ERNEST BENN, LTD., have in active preparation a book entitled *The Manufacture of Gas*, by H. Hollings, chief gas chemist to the Gas Light and Coke Co., with the assistance of members of his staff. The new developments in the gas industry since the war have been so remarkable as to make all the older text-books obsolete. In this important new work, Mr. Hollings and his colleagues describe very fully and for the first time the latest methods adopted in the gas industry, and particularly the new processes and types of plant which have been developed with special success under the direction of the Gas Light and Coke Co., at Beckton and other stations. The book, which is priced at three guineas, will be indispensable to everyone actively engaged in the gas industry or interested in its progress.

* * *

For a long time past, Professor W. A. Bone and his collaborators have been engaged in the investigation of high-pressure gaseous reactions. The results of this work are now collected in a single volume, *Gaseous Combustion at High Pressures*, by W. A. Bone, D. M. Newitt and D. T. A. Townend (Longmans Green and Co., pp. 396, 42s.) The book is divided into 21 chapters. In the first seven, there are described the new high pressure gas research laboratories at the Imperial College of Science, London, and the equipment and apparatus used. The next eight chapters are devoted to experiments on the explosion of various gas mixtures at high initial pressures; four chapters deal with the various aspects of the condition of the medium during the course of the explosions; while in the two concluding chapters there are set forth the results of experiments relating to the influence of pressure and temperature upon the explosion-ranges of hydrogen-air, carbonic oxide-air and methane-air mixtures, and the behaviour of such mixtures throughout their whole ranges on explosion at initial pressures of 10, 50 and 125 atmospheres. In the performance of the work described in this book, Professor Bone and his colleagues have shown, both on the experimental and theoretical sides, resource and imagination of the highest kind; and in the era of high-pressure work which is now opening before us, their book will undoubtedly take rank as a classic.

* * *

A new third edition of *The Trend of Flotation* has just been issued as the October Quarterly of the Colorado School of Mines (pp. 152, 25 cents). It is a revision and enlargement of the pamphlet on flotation compiled by Arthur J. Weinig, Director of Experimental Ore Dressing and Metallurgical Plant, and Irving A. Palmer, Professor of Metallurgy, and of which the second edition was published in April, 1928. An attempt has been made to give a fairly complete outline of the modern theory and practice of flotation, as applied in the United States, Canada and Mexico. The section on theoretical considerations has been extended and in part rewritten. There are brief descriptions of the flotation practice at more than thirty concentrating mills, among the latter being a number of the largest plants in the world. The various tables that constituted such an important feature of the first and second editions have been revised and enlarged when considered necessary. There is a very complete bibliography of the flotation literature that has appeared since January 1, 1921.

* * *

The Standardisation of Tar Products Tests Committee, of 166, Piccadilly, London, has just published *Standard Methods for Testing Tar and Its Products* (printed by W. Heffer and Sons, pp. 246, with numerous graphs and blank pages for notes, 7s. 6d.) The committee was formed as the result of a resolution passed at the Tar Conference held in Manchester in 1926. The present volume deals with the analysis of crude tar, refined tar (including road tar), lower boiling fractions, tar acids, naphthalene, tar bases, creosote oil, crude anthracene and pitch. There are three appendices, dealing with apparatus, constants and equivalents, and graphs, respectively. The committee was organised under the auspices of the Joint Fuel Committee, representing the Coke Oven Managers' Asosciation, the Institute of Fuel, the Institution of Chemical Engineers, the Society of British Gas Industries, and the Society of Chemical Industry; and this fact, together with the names of its constituent members, gives this volume an authority and importance of a very high order.

Indian Chemical Notes

[FROM OUR INDIAN CORRESPONDENT.]

THE value of imports of chemicals into Madras in 1928-29 improved to some extent, and reached Rs. 34 lakhs in value. Soda compounds accounted for nearly 57 per cent., and came mainly from the United Kingdom. Sodium carbonate and caustic soda were the principal soda compounds imported, and both showed increases. The United Kingdom also supplied all the sodium cyanide, amounting in value to more than Rs. 3 lakhs. Acids, alum, bleaching powder, disinfectants, potassium and zinc compounds all showed increases, but ammonia and salts thereof, as also arsenic, decreased slightly.

The total value of drugs and medicines imported increased by about 3 lakhs to Rs. 29 lakhs, owing mainly to larger receipts of camphor from Japan. Germany improved her share of synthetic camphor by 19,000 lb. to 120,000 lb. A noteworthy feature is the fresh arrival of synthetic camphor from Switzerland and Italy. Proprietary and patent medicines declined, but quinine salts increased.

Fertilisers, etc.

The imports of fertilisers more than doubled in quantity as well as in value, and amounted to 28,000 tons valued at Rs. 35 lakhs, as compared with 14,000 tons, valued at Rs. 16 lakhs, to which sulphate of ammonia contributed 11,000 tons valued at Rs. 18 lakhs. The abnormal increase in the arrivals of sulphate of ammonia is due to the fact that the ryots in this Presidency are beginning to appreciate the use of chemical manures for agricultural purposes. Arrivals of nitrate of soda, mostly from Chile, and muriate of potash, from Germany, also expanded in quantity and value. Imports of other kinds of fertilisers went up by about Rs. 2 lakhs to Rs. 9½ lakhs, Belgium, Germany and the United States of America being the chief suppliers.

Among other things imported, cement from the United Kingdom accounted for 38,000 tons valued at Rs. 20 lakhs, as against 25,000 tons valued at Rs. 14 lakhs. The value of explosives, imported mostly from the United Kingdom, amounted to about Rs. 9 lakhs, an increase of Rs. 2 lakhs over the imports in the previous year.

Imports into Burma

The report of the sea-borne trade of Burma shows that the quantity of cement imported into Burma during 1928-29 amounted to 50,000 tons, of which 34,000 tons came from the United Kingdom and 11,000 from Japan. The imports of asphalt improved from 1,200 tons to 3,800 tons. Soda compounds from the United Kingdom decreased from 65,000 cwts. to 54,000 cwts. The imports of salt decreased from 99,000 tons to 80,000 tons, supplies from Germany increasing from 32,000 tons to 41,000 tons. Imports of Liverpool salt were consequently reduced from 6,000 to 2,800 tons. The popularity of German salt has also totally driven out Spanish salt.

The exports of paraffin wax from Burma amounted to 47,000 tons valued at Rs. 216 lakhs. The Netherlands, Italy, the United States of America and China increased their supplies. Shipments to the United Kingdom, however, dropped considerably.

Vegetable Ghee

A very interesting investigation undertaken by the Mysore State is concerned with the manufacture of vegetable ghee. It is stated that the margin of profit in the oil-crushing industry is very narrow, but further expansion cannot be expected unless the manufacture of vegetable ghee is successfully established. Owing to the difficulty of obtaining pure ghee at reasonable prices, increasing quantities of solidified vegetable oils are being imported into India. An officer of the Department has now been sent to England to carry out inquiries and to bring back the most suitable plant for the manufacture of vegetable ghee.

Progress in Hyderabad

Following the example of Mysore, the State of Hyderabad is also forging ahead and trying to establish chemical industries. One of its officers was recently trained in England in tinctorial chemistry, dyeing and bleaching. A soap factory is being established. The cement company which has been established at Shahabad is doing good work, and continues to supply the whole of Southern India with cement, having an output of 40,000 tons. A private company was also encouraged to manufacture glass, and has had considerable success.

A "Chemical Age" Evening

Benn Brothers' Jubilee Celebrations

THE members of the editorial and advertisement staffs of THE CHEMICAL AGE spent a pleasant evening together on Tuesday, beginning with dinner at the Rendezvous Restaurant. During the proceedings the chairman (Mr. F. E. Hamer) made a presentation of a handsome silver Waterman fountain pen, in case, to Mr. B. Fullman, B.Sc., A.I.C., who has been on the editorial staff for some years, and has now accepted a post on the staff of the Non-Ferrous Metals Research Association. In testifying to Mr. Fullman's valuable work for the paper, the Chairman remarked that, competent journalist as he had become, his heart was still primarily in his own science of chemistry, and the Research Association was to be congratulated on having secured the services of so sound a scholar and chemist and so conscientious a worker. Mr. L. J. Moolenaar added an expression of goodwill on behalf of the publishing staff. Mr. Fullman, in acknowledging the gift, said it would be a very pleasant memento of his association with THE CHEMICAL AGE and his editorial and publishing colleagues, and he cordially reciprocated the good wishes for the future extended to him.

The Jubilee Year

The toast of "Benn Brothers' Jubilee Year" was proposed by the vice-chairman (Mr. Moolenaar), who spoke of the firm's remarkable record of progress during the last fifty years, and of the still larger hopes they had for the future. He referred to the satisfaction which Mr. Hamer's election to the board of directors had given to all sections of the staff, and congratulated him on this recognition of his services.

The Chairman, in reply, said one of the pleasantest features of his appointment was the many congratulations he had received from his colleagues and from well-known figures in the chemical industry. The coming year was one of great interest to the firm, for it marked not only the completion of fifty years of successful business, but the highest peak of prosperity the company had yet reached. Sir Ernest Benn could truthfully claim that the firm had succeeded in taking trade and technical publishing out of the back streets it formerly occupied and putting it in the front rank of newspaper enterprise, and remarkable as the past of the company had been, its future had every promise of greater things. It was interesting to know that at the Jubilee dinner at the Wharncliffe Rooms on February 1, the guest of honour would be the Lord Privy Seal (Mr. J. H. Thomas, M.P.), who might be expected to say something of great interest on the part played by the Press in the stimulation and expansion of British industry.

Afterwards the whole party attended the performance at the Palladium and so concluded a very successful gathering.

Potash in Australia

WITH the object of testing the possibilities of Lake Eyre, in South Australia, as a source of potash salts, Mr. C. T. Madigan, lecturer in geology at the University of Adelaide, is visiting that district. Mr. Madigan is making the visit with the chief object of establishing that it is possible to motor on the lake. If that can be done, it is the intention of the Department of Mines to sink bores to ascertain if salt deposits are present. Several bores to a depth of 30 ft. will be sunk by Mr. Madigan, and if the work proves satisfactory, the Department of Mines will let down bores to a depth of 1,000 ft. It is hoped to reveal the presence of potash salts. There are no known deposits in Australia, all stocks being imported from Germany. Mr. Madigan will be accompanied by Professor J. A. Prescott, of the Waite Agricultural Research Institute.

Diaries and Calendars

FROM B. T. King, C.I.M.E., managing director of King's Patent Agency, Ltd., 146A, Queen Victoria Street, London, E.C.4, we have received a neatly bound pocket engagement diary for 1930. The company, we learn, has just celebrated its coming-of-age, although Mr. King himself has been actively engaged in the patenting of inventions, etc., for over 43 years.

The Classic Colour Press, of Katesgrove, Reading, (London office, 195, Strand, W.C.1) forward a wall calendar with monthly sheets.

W. H. Willcox and Co., Ltd., of 38, Southwark Street, London, S.E.1, have sent a monthly wall calendar.

Drying of Paint and Varnish Oils

Notes on Recent Work

IN a paper on "Recent research on fats bearing upon the drying of oils in paint and varnish" read on Friday, January 10, before the Manchester Section of the Oil and Colour Chemists' Association, Professor T. P. Hilditch gave some account of investigations by various workers during the past two or three years on matters affecting the oxidation and polymerisation of paint and varnish oils. Recent work by Japanese and German authorities which, it was stated, had made some additions to knowledge of the probable chemical and physical changes concerned in oil polymerisation, was first considered. Professor Hilditch then went on to discuss certain features in the oxidation or drying processes which have lately been under examination.

The most important of these, said the author, from the theoretical point of view, was the definite proof given by Morrell and Marks of the presence of the grouping $-C(OH)=C(OH)-$ or $-CO.CH(OH)-$ in oxidised tung oil films, whilst some new observations on the earliest stages of oxygen absorption by unsaturated oils were also mentioned. The function of anti-oxidants in drying oils and the possibility of the presence of these substances during the formation of glycerides in the living organism were referred to in some detail.

Professor Hilditch concluded his paper with a résumé of the means available at present by which the utility of a fatty oil in paints or varnishes could be assessed. The importance of considering the detailed fatty acid composition and, equally, the distribution of the fatty acids amongst the glycerides of drying oils, was urged. In this connection reference was made especially to the work of Eibner and his school on linseed oil and their deduction that up to a point—that is, so long as it was entirely held in union with two radicles of linolenic or even linoleic acid—the presence of combined oleic acid in linseed oil was no detriment to the drying power of the oil. The bearing of recent work on the fatty acid composition of seed oils of closely related botanical species and on the glyceride structure of seed fats upon the type of oil likely to be most suitable for paint was indicated, and some suggestions were offered with reference to possible selection of the best drying type of linseed oil and of lines which might be followed in a search for efficient substitutes for this oil amongst other natural fatty oils or mixtures thereof.

A vote of thanks to the author was moved by Dr. Jolly and seconded by Mr. G. A. Campbell. Mr. F. Sowerbutts, Mr. A. Hancock, and Messrs. Bunbury and Baird contributed to the discussion.

Nitram, Ltd., Transferred to I.C.I.

Voluntary Liquidation Scheme

"IT has now been decided"—Mr. R. A. Lynex, liquidator, states in an official circular—"to transfer the undertaking of this company (Nitram, Ltd.) to Imperial Chemical Industries, Ltd., with whom we have always been closely associated, and whose organisation will, of course, as far as necessary, carry out our unexecuted contracts; we are therefore advising you that for this reason Nitram, Ltd., has gone into voluntary liquidation.

"As from January 1, 1930, Imperial Chemical Industries, Ltd., will be very pleased to execute your orders, and to give their careful attention to any business which you might have entrusted to ourselves had the liquidation not taken place. We wish to add that those members of our staff with whom you have been accustomed to deal will henceforward be included in the personnel of Imperial Chemical Industries, Ltd."

Chemical Centenaries in 1930

AMONG anniversaries which occur in 1930 are a number of chemical interest. Three hundred years ago was born Kunckel (1630–1703), a German chemist. The year 1830 was a "vintage year," for in it were born the Frenchman Raoult (1830–1901) whose work helped to lay the foundations of physical chemistry, and who received the Davy Medal of the Royal Society in 1892; the Dutchman van Bemmelen (1830–1911), also a physical chemist; and the German Lothar Meyer, who made contributions to our knowledge of the periodic classification of the elements, especially by his famous curve of the atomic volumes.

Progress in Minerals Research

Effects of Chemical Processes

DR. T. THORNTON READ, Professor of Mining in Columbia University, in reviewing progress in minerals research and technology, states that much progress is being made in improving the refining of oil, the new pipe stills being a great improvement over the cruder old type. Cracking, which yields much higher proportions of gasoline, the needed product, is making much progress, and the de Florez, a new vapour phase process, attracts much attention. A new chemical process that yields pure cheap aluminium chloride will have much effect on the oil industry, as it makes improved refining processes possible. The Standard Oil Co., of New Jersey is effecting the hydrogenation of heavy oils by a catalytic process. The oil industry is much interested in corrosion problems, as is the steel industry.

Coal Distillation

In bituminous coal, which is by far the largest field, the most interesting developments are in the low-temperature coking of raw coal, yielding a smokeless fuel, gas and a long list of important by-products. The coke has to compete with anthracite, with which it is at a disadvantage because it is more friable and bulky; the producers have countered by marketing a coke that has much less ash than anthracite. Ammonia and benzol are the principal by-products and ammonia is relieving the States from their former dependence on Chile as a source of nitrates, while benzol finds a ready market in the new lacquers, that are now so popular and almost universally used in the painting of automobiles. The low-temperature tars can be used for the production of synthetic resins, and it is stated that unbreakable substitutes for plate glass in automobiles and for dishes are already within the bounds of possibility. Ammonia and methanol are now produced directly from coal under high pressure, so successfully that there is danger of production getting ahead of consumption. Reports from Germany claim that gasoline produced in a similar way from coal is being sold there on a commercial basis. It seems probable that the next ten years will see more changes in the utilisation of coal than in any other phase of the mineral industry.

Improved Metals and Alloys

Interest is alive among the producers of steel from iron and steady technical advances are made. The steady integration of iron and steel plants is a notable feature, processes being so interrelated that a coke plant, blast furnace, and steel plant must work in harmony, utilising each other's by-products. Popular interest centres, however, not in the large tonnages of ordinary steel that go into railroads, bridges, building construction, and a host of other industrial uses, but in the special steels that are used in much smaller amounts, especially the rustless or stainless steels. The Chrysler Building, now nearing completion in New York, is a striking example of this, for its big dome and the metal work of the first four stories are being made of a high-chromium corrosion-resistant steel. Since chromium is expensive, this special alloy is also, but is expected to pay for itself in the freedom from the necessity of cleaning it that imposes a heavy maintenance burden on many of the architectural metals. The whole problem of corrosion resistance is an intensely interesting one that concerns nearly all phases of the mineral industry. The oil producer is interested here because the salt waters of some oilfields contain chemicals that will attack any form of iron, leading to the substitution of aluminium for it in those particular places. The metals are thus competing actively as to which are the most serviceable to industry. It is claimed that aluminium automobile trucks, which weigh no more loaded than an ordinary one does empty, are already an actuality, and that railroad cars of aluminium may soon be brought into commercial use.

Steel Rationalisation

THE ENGLISH STEEL CORPORATION (formed a year ago as a fusion of the steel interests of Vickers Armstrongs and Cammell Laird) has decided, as part of its scheme of rationalisation, to close the Yorkshire Steel and Iron Works at Penistone, one of its undertakings. Among other works which are likely to be similarly affected are the Cyclops Works at Sheffield, the Openshaw Works at Newcastle, and the Elswick Works Stamping Department at Newcastle. The Grimesthorpe Works at Sheffield are to be considerably reduced in size.

China Clay Imports—December, 1929

A RETURN showing the quantities and value of China Clay, including China Stone, imported into Great Britain and Northern Ireland, as registered in the month of December, 1929, is as follows :—

COUNTRIES WHENCE CONSIGNED.	QUANTITIES. Tons.	VALUE. £
Germany	64	316
Canada	2	5
Total	66	321

China Clay Exports—December, 1929

A RETURN showing the quantities and value of the exports of China Clay, including Cornish or China Stone, the produce of Great Britain and Northern Ireland, from Great Britain and Northern Ireland, as registered in the month of December, 1929, is as follows :—

COUNTRY OF DESTINATION.	QUANTITY. Tons.	VALUE. £
Sweden	2,326	4,943
Norway	649	1,947
Denmark	482	1,302
Germany	6,317	13,736
Netherlands	4,058	9,867
Belgium	6,292	12,475
France	4,529	9,103
French Indo-China	5	9
Switzerland	280	523
Portugal	21	78
Spain	1,706	4,951
Italy	3,838	8,938
Austria	10	35
Greece	31	145
Egypt	3	12
Siam	117	158
Japan	10	118
United States of America	28,281	60,064
Uruguay	2	8
Irish Free State	2	9
Union of South Africa	3	45
British India, via Bombay	3,054	8,637
Via Madras	1	14
Via Bengal, Assam, Bihar and Orissa	187	861
Hong Kong	—	1
Australia	45	307
New Zealand	1	7
Total	62,252	138,318

Research Fellowships in Metallurgy and Mining

IN co-operation with the United States Bureau of Mines and the State Mining Experiment Station, the School of Mines and Metallurgy of the University of Missouri offers four fellowships. These fellowships are open to graduates who have the equivalent of a B.Sc. degree, and have had the proper training in mining, metallurgy or chemistry, and who are qualified to undertake research work. The income of each fellowship is $800 for ten months beginning September 1, 1930. Fellows pay fees amounting to approximately $42 per year.

Fellows will register as students in the School of Mines and Metallurgy of the University of Missouri, and become candidates for the degree of M.Sc. (unless this or an equivalent degree has been earned). Their class work will be directed by the heads of the departments of instruction, but about half of their time will be spent in research work under the direction of the Bureau of Mines staff resident at the School of Mines. The purpose of this work is to undertake the solution of definite problems confronting the mining and metallurgical industries of the State of Missouri. For 1930–31 the four fellowships will be granted in the following subjects: Ore Dressing, Problems in Gravity Concentration, Flotation, Ball Milling, and Magnetic Concentration. Applications, with a certified copy of collegiate record, statement of professional experience, and names and addresses of three references will be received up to June 15, 1930, and should be addressed to the Director, School of Mines and Metallurgy, University of Missouri, Rolla, Missouri.

From Week to Week

THE CARTEL of the Czechoslovakian wood distillers, the Accetic G.m.b.H., of Prague, which expired on December 31, 1929, has now been prolonged until the end of 1933.

Mr. E. G. RADLEY, of H.M. Geological Survey, has been awarded the Wollaston Donation Fund of the Geological Society of London, for work on the chemical analysis of rocks and minerals.

FOR THE COMING BEET SUGAR SEASON, farmers have contracted with the factories to grow 315,000 acres, an increase of 83,000 acres over 1929, which in turn showed an increase of 30 per cent. on 1928.

MERCURY PRODUCTION in the Bogojno district of Jugoslavia has been begun by a Polish group. Up to now, two chamber ovens have been put into operation, eight tons of ore being worked up daily. It is hoped to bring others into operation in the near future.

THE HARRISON MEDAL of the Pharmaceutical Society of Great Britain, established to perpetuate the memory of Colonel Edward Frank Harrison, Director of Chemical Warfare during the War, was presented to Mr. P. A. W. Self, F.I.C., at a meeting of the society on Tuesday.

THE REPORT of the death of Professor A. A. Michelson, the eminent physicist, is incorrect. Professor Michelson is now on his way to Bermuda, where he will stay for a holiday. The report was first made public in France, at a meeting of the Académie des Sciences, and obtained wide circulation.

DR. S. G. BARKER, Director of Research to the Woollen and Worsted Research Association, will present a paper on "The Measurement of Fading" at Nottingham University College on Wednesday next, to a joint meeting of the Nottingham Sections of the Society of Dyers and Colourists and the Society of Chemical Industry.

THE DEUTSCHE CHEMISCHE GESELLSCHAFT held a special meeting recently to commemorate the hundredth year of publication of the *Chemische Zentrallblatt*, the well-known journal of abstracts. The history and development of the Zentrallblatt were described in an address given by the editor, Dr. M. Pflücke, which is now reprinted in pamphlet form from the *Berichte*, where it was published.

THE DEPARTMENT OF OVERSEAS TRADE announces that Mr. Spencer Stuart Dickson, H.M.'s Minister to the Republic of Colombia, who will shortly proceed to his post, will be in attendance at the offices of the Department on January 23, 24 and 27, and is prepared to interview firms interested in business with that republic. Firms desiring interviews with Mr. Dickson should apply to the Comptroller General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting the reference 2,582/30.

THE MIDLAND CHEMISTS' DINNER AND DANCE has been fixed this year for Saturday, January 25, at the Midland Hotel, New Street, Birmingham. After dinner, at which the speeches will be short, there will be dancing and cards. For the first time in the Midlands the dinner is being organised by an independent committee, representing all chemists in the district. It is intended to use the occasion as an opportunity for chemists, chemical engineers, manufacturers, managers and merchants to "get together." The reception will take place at 6 p.m., and the dinner at 6.30. Tickets: Gentlemen, 12s. 6d.; ladies, 10s. 6d.; double tickets, one guinea. Applications must be made, on or before January 20, to Mr. G. King, 25, Whitmore Road, Small Heath, Birmingham.

THE INSTITUTE OF INDUSTRIAL ADMINISTRATION was registered about seven years ago for the purpose of promoting education in the principles of industrial administration and their application. On behalf of the Institute, a strong board of examiners, headed by Principal H. Schofield, has worked out a complete system of study for those who look forward to holding executive positions. An examination scheme for the Diploma of Industrial Administration has been published and circulated. The syllabuses are in three stages. The first includes economic theory, industrial history, the law and industry, and introduction to industrial administration. The second syllabus includes personnel policy and administration; market investigation and sales forecasting; sales policy and administration; distributive policy and methods; publicity policy and administration; office administration and the methods; costing and management statistics; financial management and budgetary control; production policy and progress control; design administration and quality control; process planning and production estimating; building planning and plant management; foremanship; purchasing and material control; and home and overseas transportation. The third stage syllabus includes the management function; business statistics; business organisation; industrial relationships; and social factors and industry. Candidates who have satisfied the examiners obtain the Diploma, become Associates of the Institute, and are entitled to use the initials A.I.I.A. after their names. Further details may be obtained from the secretary of the Institute, 47-51, King William Street, London, E.C.4.

COURTAULDS', LTD., announce that Mr. John Coldbrook Hanbury-Williams has been elected a director of the company.

MR. A. CHESTER BEATTY has, owing to extreme pressure of business, resigned from the boards of British Celanese, the Burma Corporation, and N'Changa Copper Mines.

AN AMMONIA PLANT is to be erected in Polish Upper Silesia by the leaders of the coal industry, with the object of utilising waste gases from coke ovens. The products will include mixed fertilisers.

THE *Chemiker Zeitung* states that the new coke-oven installation of Synthetic Ammonia and Nitrates, Ltd., at Billingham, consists of 64 ovens, producing 1,000 tons of coke (per day ?), and the necessary plant for the recovery of by-products.

THE RUSSIAN SULPHURIC ACID INDUSTRY is to be extended greatly. The utilisation of waste gases from smelting works is to be systematically developed. The smelting works already operating can supply sulphur dioxide for the production of 800,000 tons of acid.

RUSSIAN ORDERS FOR CHEMICALS placed in Germany in the first half of December included 1,500 tons of sodium nitrate, 42 tons of Schweinfurth green, 50 tons methanol, 16 tons of resins, 26 tons of indigo, 20 tons of Gamma-acid, 40 tons of H-acid, as well as 4,000 kilos of miscellaneous dyestuffs.

"GRIT EMISSION AND THE REMEDY" is the title of a brochure recently issued by Pneumatic Conveyance and Extraction, Ltd., of Broadway Buildings, Broadway, Westminster, London, S.W.1. Copies of this publication may be obtained, on application to the company, by anybody who is interested in the subject.

DR. R. J. BROCKLEHURST, senior lecturer in the department of physiology and biochemistry at University College, London, has resigned on his appointment to the chair of physiology in the University of Bristol. Dr. Brocklehurst, while at Oxford, was awarded the Radcliffe Travelling Fellowship, visiting America and Germany in 1926 and 1928.

THE EGYPTIAN TARIFF REVISION BILL comes into force, according to present proposals, on February 17. The *Board of Trade Journal* for January 9 contains a translation of the Bill, with schedules of proposed import and export duties, including (Section 6) chemical and pharmaceutical products; colours and varnishes; perfumery, soap, candles and the like; glues and gelatines; explosives; fertilisers.

CANADA GYPSUM AND ALABASTINE, LTD., has acquired a site of eight acres at East Calgary, where between $140,000 and $150,000 are to be spent on the erection of a factory for the manufacture of wall plaster and gypsum tile. Later on the company intends to increase the output of the plant, one of the first additions being a plaster board mill. The raw materials are to be obtained at the outset from the Portland quarries, near Kamloops, B.C., but the company intends to develop in the near future another quarry near Wardner, B.C., in the Crow's Nest Pass.

A CONSPICUOUS FEATURE of the British Road Tar Association's stand at the Birmingham Section of the British Industries Fair will be the Association's tar viscosity demonstration apparatus, which will indicate, at a glance, the desirable properties necessary in tar for roadmaking purposes. There will also be a selection of photographs illustrating the value of all-British materials for road construction, and some interesting literature on the tar treatment of roads. An invitation is extended to all highway authorities and others interested in road construction to visit the stand and discuss any problems relating to the tar treatment of roads.

ATTENTION may be drawn to the public lecture to be delivered before the Institution of Chemical Engineers by Dr. Herbert Levinstein, F.I.C. (Member), on Friday, January 24, in the Lecture Theatre of the Institution of Civil Engineers, Westminster, London, on "Films and Fibres Derived from Cellulose." The President, Mr. J. Arthur Reavell, M.I.Mech.E., will take the chair at 6.30 p.m. Dr. Levinstein, the official notice states, has long been one of the best known personalities in the chemical industry, and is the present President of the Society of Chemical Industry. He has been a pioneer in the development of cellulose industries involving the manufacture of films and fibres, and his lecture promises to be of outstanding interest and importance. Non-members are welcome, and tickets may be had on application to Professor J. W. Hinchley, Hon. Secretary of the Institution, at Abbey House, Westminster.

Obituary

MR. B. V. VICKERS, founder and principal of V. Vickers and Co., nickel silver manufacturers, of Sheffield and Birmingham, aged 56, as the result of an accident while he was out with a shooting party. It appears that a dog snatched at its lead, causing a gun to go off, and Mr. Vickers was shot in the back and died immediately.

DR. S. Z. DE FERRANTI, F.R.S., the famous electrical engineer, on Monday, January 13, at Zurich, aged 65. Much of the present system of electricity generation and transmission throughout the world is based on his pioneering work. He was a former president of the Institution of Electrical Engineers, which body also elected him an honorary member and awarded him its Faraday Medal. He was the head of the firm of Ferranti, Ltd., of Hollinwood, near Manchester.

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

321,651. CELLULOSE ETHERS. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 9, 1928.

Water-insoluble cellulose ethers are extracted with a mixture of water and a water-soluble solvent such as alcohol, acetone, or acetic acid, so as to remove constituents of low viscosity and which swell in water. These may be precipitated by the addition of an electrolyte. An alkali and/or bleaching agent may be added to the extracting agent to improve the colour of the product. Cellulose ethers are thus rendered more suitable for the manufacture of threads, plastic masses, and lacquers.

321,689, 321,690-1-2. TREATING FATTY OILS, ETC. L. Auer, 42, Jokai Utcza, Budapest. Application dates, May 4, 8, and 9, 1928.

321,689. This is an addition to 287,943. Fatty oils such as tung, linseed, castor, fish, sunflower, rape seed, pine, corn, olive oil, are heated with modifying agents such as sodium bicarbonate, with or without barium peroxide, to harden them. Modifying agents which impart a negative surface charge to the fatty oil in which they are dispersed are more effective. Dispersion is facilitated by auxiliary substances such as silica gel, formaldehyde, or phenol. The mixture may be subjected to radiation or electrical action. The hardened oils or their solutions may be vulcanised by treating with sulphur or sulphur chloride. Hydrochloric acid liberated is removed by neutralising substances such as calcium oxide or an organic amine, or vapours of basic substances. Accelerators such as tetramethyl-thiuram disulphide, activators such as zinc oxide, and antioxidants such as *p*-aminophenol may also be used. In an example, linseed oil may be heated with sodium bisulphite, while subjected to a potential difference of 200-250 volts between two electrodes half an inch apart in the mixture. The products are used in the manufacture of varnishes and lacquers.

321,690. Fatty oils, resins, naphthenic acids or fats are solidified or hardened by heating with peroxide of magnesium, calcium, strontium, barium, sodium, zinc, cerium, nickel, or bismuth. The products may be vulcanised or emulsified and used in the manufacture of varnish, linoleum, etc. The products may be treated with sulphur dioxide and other gases, and with various organic substances.

321,691. Substances containing unsaturated acids of high molecular weight, such as drying oils, resins, naphthenic acids, etc., are heated, in the absence of water, with alkali metals or their oxides or hydroxides, with or without an alkaline earth peroxide. The products are saponaceous compounds which may be used as an aqueous emulsion in the manufacture of soap, varnish, linoleum, or may be vulcanised as a substitute for rubber. The solution of the alkali or alkali metal may be promoted by the addition of organic substances such as phenols, arylamines, hydrocarbons, ketones, or alcohols. The products can be vulcanised by alternate treatment with sulphur dioxide and sulphuretted hydrogen, and accelerators may be used such as triphenyl guanidine, and activators, such as zinc oxide. Thus, linseed, fish, castor, rape, olive, or sunflower oil or resin may be heated in vacuo or at atmospheric pressure with sodium oxide, lithium hydroxide, sodium or potassium hydroxide or metallic potassium, together with *p*-cresol.

321,692. Fatty oils, waxes or resins are emulsified with an aqueous medium containing emulsifying agents such as soaps, sulphonated oils, sulphonated alkylated aromatic hydrocarbons or their salts, albumen, saponin, or phenols, and treated with modifying agents such as electrolytes. The product may be vulcanised by treatment with sulphur dioxide and sulphuretted hydrogen, employing benzoquinone as an accelerator. The emulsion may be mixed with natural or artificial rubber, and after concentrating used in the manufacture of varnish, plastics, linoleum, impregnating agents, etc. Linseed oil may be emulsified with ammonium oleate, and the emulsion agitated with sodium bisulphite and magnesium peroxide, calcium carbonate and barium peroxide, or sodium *p*-toluene sulphate, in a stream of nitrogen. The emulsion may be vulcanised.

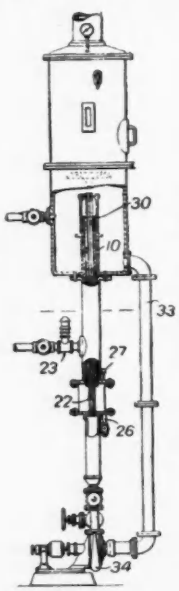
321,693-4. VULCANISATION OF UNSATURATED ORGANIC COMPOUNDS. P. Stamberger, 11, Rakoczi Ut, Budapest, and L. Auer, 42, Jokai Utcza, Budapest. Application date, May 10, 1928.

321,693. Compounds containing acids of high molecular weight such as fatty oils, *e.g.*, linseed or rape oil, resins, naphthenic acids, etc., are heated and mixed with sulphur, with or without accelerators such as mercapto-benzthiazole, or activators such as zinc oxide. The oils, etc., may be employed in solution in benzene or petroleum ether. The product containing sulphur is emulsified with an oil emulsion in water, or an aqueous glycerol or starch solution, which may contain dispersing agents such as soaps, sulphonated alkylated aromatic hydro-carbons or their salts, albumen, saponin, or phenols, and the emulsion heated under pressure. The emulsion may be mixed with rubber latex and used for impregnating textiles or for varnishes.

321,694. The above process is applied to unsaturated organic substances which have been modified by treatment with alkalies, salts of organic or inorganic acids, metallic peroxides, etc.

321,697. SYNTHETIC RESINS. Soc. des Usines Chimiques Rhone-Poulenc, 21, Rue Jean-Goujon, Paris, N. B. Grillet, 10, Boulevard Maillot, Neuilly-sur-Seine, and E. C. Cottet, 89, Cours Gambetta, Lyons. Application date, May 17, 1928.

A mixture of formaldehyde with a polyhydric phenol such as resorcinol is distilled in vacuo at a low temperature to eliminate water. An intermediate product is obtained which is suitable for the production of moulded articles, varnishes, etc. Alternatively, water may be eliminated by precipitating the condensation product by adding more water. The product may be dried at a low temperature in vacuo or in a current of air, and fillers, colouring matter, etc., may be added. When used for varnishes, the products may be dissolved in acetone, methyl or ethyl alcohol, benzyl alcohol, or ethyl lactate. Several examples are given.



321,698

321,698. DISTILLING AND EVAPORATING LIQUIDS. A. E. White, London. From Swenson Evaporator Co., Lathrope Avenue, Harvey, Ill., U.S.A. Application date, May 18, 1928.

The liquid is forced at high velocity through a straight path to the bottom of vertical tubes 22 surrounded by a heating jacket 10. The liquid boils in the tubes and issues at the top at a high velocity. A head of liquid at the top of the tubes is avoided. Steam is admitted by a pipe 23, passes upward outside the baffle plate 30, and downward inside it. Condensed water is drawn off at 26, and gases at 27. The liquid returns through pipe 33 to the pump 34.

321,699. VULCANISING OILS, ETC. L. Auer, 42, Jokai Utcza, Budapest, and N. Strachovsky, 21, Phœnix Lodge Mansions, Brook Green, London. Application date, June 13, 1928.

Vegetable or animal oils, resins, fats, naphthenic acids or these bodies or rubber after treatment with modifying agents (see 321,689 above) are vulcanised by heating with sulphur or a sulphurising compound, in a current of steam. Solvents such as benzene, xylene, or tricresyl phosphate may be added. The

steam forms an emulsion with the product, and this may be used to impregnate fabrics, etc. An example of the treatment of linseed oil is given.

321,703. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 9, 1928.

4[1]-Naphthalimido-N-pyrazolanthrone and N-alkyl derivatives are treated with alkaline condensing agents to obtain anthraquinone vat dyes. The unalkylated products may be alkylated, or any of the products may be halogenated. In an example, 4-chlornaphthalimide and pyrazolanthrone are condensed to obtain the starting material, which is then fused with alcoholic potash. The product may be alkylated by treating with toluene sulphonic acid methyl ester and sodium carbonate in trichlorbenzene, and this product may be chlorinated or brominated.

321,720. CALCIUM HYPOCHLORITE. L. Mellersh-Jackson, London. From Mathieson Alkali Works, 250, Park Avenue, New York. Application date, August 18, 1928.

Lime is chlorinated in the presence of water and caustic soda. The lime and caustic soda may be simultaneously chlorinated, or the caustic soda may first be chlorinated, lime added, and chlorination continued till 1 per cent. of alkali remains. The calcium hypochlorite may be recovered by evaporation or chlorination.

321,723. SAPONACEOUS COMPOUNDS. L. Auer, 42, Jokai Utcza, Budapest. Application date, May 8, 1928.

Fatty oils, resins, mixtures of natural and synthetic resins, or naphthenic acids are heated, at increased pressure, with alkali metals, or their oxides or hydroxides, with or without alkaline earth peroxides, to obtain saponaceous compounds. These may be used as such, or in the manufacture of soap, varnish, or linoleum, or may be vulcanized, to form a rubber substitute. The mixture may be treated with radiations or with various gases.

321,724. MODIFYING THE PHYSICAL PROPERTIES OF ORGANIC ISOCOLLOIDS. L. Auer, 42, Jokai Utcza, Budapest. Application date, May 4, 1928.

Fatty oils, or natural resins, are heated with a modifying agent, consisting of an organic residue united to an inorganic acidic residue, *e.g.*, iodoform, trichloracetic acid, organic sulphonic acids, halides, and esters, esters of inorganic acids or inorganic salts of organic bases, *e.g.*, diphenylamine hydrochloride. The modifying agent may be applied in a colloidal state, in the presence of silica gel, formaldehyde, or phenol. The products may be vulcanized, and accelerators and antioxidants may be present. Thus, linseed oil may be heated with triphenyl-chlormethane, 2 : 5-dichlorbenzene sulphonic acid, triphenyl phosphate, diphenylamine hydrobromide, or *p*-nitro-acetanilide.

321,725. BASES FOR WATERFAST VARNISHES AND LACQUERS. L. Auer, 42, Jokai Utcza, Budapest. Application date, May 4, 1928.

These products are obtained by heating fatty oils, or resins with a modifying agent insoluble in water, consisting of metal compounds such as tin carbonate or the insoluble modifying agents included in 321,724 above. The metal compounds may be produced in situ, and a peroxide may also be added, as well as the usual plasticisers. The products may be vulcanised, with accelerators, antioxidants, and activators.

321,726. RUBBER SUBSTITUTES. L. Auer, 42, Jokai Utcza, Budapest. Application date, May 4, 1928.

These products are made by heating fatty oils with modifying agents such as carbonates, sulphites, sulphides, thiosulphates, hydrosulphites, and vulcanising the modified material. Plasticisers, accelerators, antioxidants, and activators may be used.

321,727. MODIFYING THE PHYSICAL PROPERTIES OF RESINS. L. Auer, 42, Jokai Utcza, Budapest. Application date, May 4, 1928.

Natural resins are treated with an organic residue united to an inorganic acidic residue, *e.g.*, iodoform, trichloracetic acid, eosin, organic sulphonic acids, halides, and esters, esters of inorganic acids, etc., or with tin sulphite or barium carbonate. The modified resins may be vulcanised.

321,728. NITRIC ACID. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, June 21, 1928.

Liquid or vaporous nitrogen peroxide is treated with oxygen in the presence of dilute nitric acid in a filled fractionating column. The temperature varies from 20-25° C. in the upper part to 100°-125° C. in the lower part. At the zone where the temperature is 85°-90° C. the vapour consists of almost pure nitric acid, which is drawn off and condensed. The column can be heated by passing in vapour from the nitric acid of lowest vapour pressure, having a boiling point of 123° C. passing from the base of the column.

321,737. DYEING. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 21, 1928.

Diazonium compounds are treated with fluorsulphonic acid and the resulting diazonium-fluorsulphonates are combined with coupling components on the fibre. Examples are given.

321,738. SYNTHETIC DRUGS AND DYESTUFF INTERMEDIATES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 21, 1928.

These products, which are employed therapeutically or as intermediates in the manufacture of therapeutic substances and dyestuffs, are obtained by the reaction of a 2- or 4-alkylquinoline halogenated in the 4- or 2-position, or a halogen derivative, with an aminobenzene carboxylic acid or ester. Some examples are given.

321,843. ALIPHATIC AND CYCLOALIPHATIC SATURATED SULPHINIC ACIDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany Application date, November 26, 1928.

An open chain aliphatic or cycloaliphatic saturated hydrocarbon is treated with sulphur dioxide in the presence of an anhydrous halide of aluminium or boron at a pressure up to 25 atmospheres and temperature of 50°-60° C. Examples are given of the production of *n*-pentane sulphinic acid and cyclo-hexane sulphinic acid.

321,850. PRESERVING INDIARUBBER. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, December 3, 1928.

To prevent mould, raw rubber is treated with water-soluble inorganic acids containing one or more organic radicles, or water-soluble salts of these acids, *e.g.*, butylated naphthalene sulphonic acid, mono-methyl sulphuric acid, or sodium dicresyl-phosphate.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—295,593 (I.G. Farbenindustrie Akt.-Ges.), relating to 4-methyl-6-halogen-hydroxy-thionaphthenes, see Vol. XIX, p. 369 ; 296,988 (W. G. Poetzsch), relating to electrolytically depositing chromium, see Vol. XIX, p. 45 (Metallurgical Section) ; 297,116 (T. Goldschmidt Akt.-Ges.), relating to colloidal white lead, see Vol. XIX, p. 497 ; 297,687 (Soc. of Chemical Industry in Basle), relating to dyestuffs, see Vol. XIX p. 519 ; 301,395 (F. Hofmann and C. Wulff), relating to cracking or destructive hydrogenation of oils, see Vol. XX, p. 105 ; 302,306 (Soc. d'Etudes Minières et Industrielles), relating to purification of nitrogen and hydrogen, see Vol. XX, p. 189 ; 305,102 (British Thomson-Houston Co., Ltd.), relating to electromagnetic separation of complex ores, see Vol. XX, p. 39 (Metallurgical Section).

Specifications Accepted with Date of Application

293,302. Synthesis of chemical substances. M. Polanyi and S. von Bogdandy. July 2, 1927.

293,690. Sulphonating fatty acids and fatty acid derivatives. Naamlooze Vennootschap Chemische Fabriek Servo, and M. D. Rozenbrock. July 9, 1927.

297,362. Azo dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. September 19, 1927. Addition to 210,081.

303,176. Ethyl alcohol and other products from coal distillation gases. Compagnie de Bethune. December 29, 1927.

311,225. Metallic oxides for use as pigments, Producing. Metallges. Akt.-Ges. May 7, 1928.

323,240. Catalytic synthesis of aliphatic alcohols. Baron Marks. (*E. I. Du Pont de Nemours and Co.*) June 22, 1928.

323,187. Alicyclic lactones of hydrogenated aromatic polycyclic series of hydrocarbons. G. Schroeter and A. Gluschke. August 23, 1928.
323,205. Calcium hypochlorite, Manufacture of. L. Mellersh-Jackson. (*Mathieson Alkali Works.*) August 18, 1928.
323,332. Metal carbonyls, Manufacture of. J.Y. Johnson. (*I.G. Farbenindustrie.*) November 30, 1928.
323,353. Aluminium alloy. H. C. Hall and T. F. Bradbury. December 18, 1928.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Addy, R., Carlton Main Colliery Co., Ltd., and Tozer, C. W. Retorts for low-temperature distillation of carbonaceous material. 649. January 7.
Anderson, L. J., and Cash, W. A. Manufacture of titanium-containing pigments. 986. January 10.
Arnold, C., and Dow Chemical Co. Electrolytic production of light metals. 1,078. January 11.
Baxter, J. P., and Imperial Chemical Industries, Ltd. Production of carbon. 582. January 7.
British Celanese, Ltd. Treatment of chemical materials. 500. January 6. (United States, January 4, 1929.)
—— Production of textile materials. 753. January 8.
—— Ellis, G. H., Kirk, E. W., and Olpin, H. C. Manufacture of organic compounds. 754. January 8.
—— Colouring cellulose derivatives. 845. January 9.
Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Protecting wool, etc., against textile pests. 863. January 9.
—— Manufacture of gaseous fluorine. 864. January 9.
—— Manufacture of solutions, etc., from cellulose ethers. 865. January 9.
—— Manufacture of waxes. 1,022. January 10.
—— Manufacture of material rich in vitamines. 1,023. January 10.
—— Process for reserving on animal fibres. 1,024. January 10.
—— Manufacture of 2-aryl-4 : 6-dihydroxy-1 : 3 : 5 triazines. 1,112. January 11.
Colbeck, E. W. Apparatus for treatment of ammonium chloride liquors, etc. 561. January 7.
Coley, H. E. Manufacture of tin. 492. January 6.
I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Production of derivatives of anthracene series. 724. January 8. (September 26, 1928.)
—— Production of vat dyestuffs. 725. January 8.
—— Manufacture of vulcanised articles from rubber, etc. 857. January 9.
—— Manufacture of vat dyestuffs of the N-dihydro-1.2.2^1.1^1 anthraquinone series. 858. January 9.
—— Separation of liquid mixtures by fractional distillation. 1,032. January 10. (July 20, 1928.)
—— Fertilisers. 1,081. January 11.
I.G. Farbenindustrie Akt.-Ges. Purification of gases containing acetylene. 480. January 6. (Germany, January 16, 1929.)
—— Polymerising hydrocarbons of the lintadiene series. 869. January 9. (Germany, January 9, 1929.)
—— Manufacture of hormones. 1,025. January 10.
—— Manufacture of strontium oxide. 1,026. January 10. (Germany, January 12, 1929.)
—— Production of 1 : 1 : 2-trichlorethane. 1,029. January 10. (Germany, January 31, 1929.)
—— Manufacture of 1^1-chloro-1-methyl-naphthalene. 1,097. January 11. (Germany, January 12, 1929.)
Imperial Chemical Industries, Ltd. Hydration of acetylene. 461. January 6.
—— Manufacture of propellant explosives. 543. January 6.
—— Apparatus for treatment of ammonium chloride liquors, etc. 561. January 7.
—— Pyrolysis of hydrocarbons. 562. January 7.
—— Apparatus for effecting dust removal from gases. 801. January 9.
—— Aircooled internal-combustion engines. 824. January 9.
Linshead, R. P., Scottish Dyes, Ltd., Thomas, J., and Thorpe, J. F. Treatment of phthalimide derivatives. 1,102. January 11.
Palacio, T. de. Producing sulphuric acid and metals simultaneously. 764. January 8.
Soc. d'Etudes Scientifiques et d'Entreprises Industrielles. Manufacture of phosphoric acid and gaseous mixtures. 859. January 9. (Germany, January 9, 1929.)
—— Manufacture of phosphorus or oxygen compound thereof and gaseous mixtures. 860. January 9. (Germany, January 9, 1929.)
Weinmann, F. Manufacture of *d*-gluçuronic acid. 634. January 7. (Germany, January 22, 1929.)

By-Product, Sulphate in Germany

Details of Production

THE German Ammonia Sales Cartel (Deutsche Ammoniak-Verkaufsvereinigung G.m.b.H.) of Bochum, announces that it sold 400,000 metric tons of by-product ammonium sulphate in 1928, equivalent to approximately 80,000 tons of primary nitrogen. This cartel is a member of the German Nitrogen Syndicate, of Berlin, dominated by the I.G., which now produces about 700,000 tons of primary nitrogen annually. The nitrogen cartel's membership also includes the calcium cyanamide producers.

Production by the by-product ammonia producers (chiefly the Ruhr coke and gas plants) increased by 13 per cent. in 1928 over the preceding year. The increase is said to be chiefly from the new synthetic plants (Ruhrchemie Aktiengesellschaft and Gasverarbeitung Aktiengesellschaft), which contributed 43,000 tons of ammonium sulphate to the total 1928 figure). Presumably ammonia made from coke-oven hydrogen is ranked as by-product. Despite this increased output, stocks on hand at the end of 1928 were but two-thirds of their level at the beginning of the year. Export sales by the by-product ammonium sulphate cartel were 40 per cent. higher than 1927.

Fuel Research in Canada

A Recent Official Publication

THE Mines Branch of the Dominion Department of Mines at Ottawa has forwarded to the High Commissioner of Canada in London, copies of Report No. 696, containing particulars relative to investigations of fuels and fuel testing carried out in 1927. Among the reports bound up in this volume are the following : " The use of gas and by-product cokes for domestic heating purposes," by E. S. Mallock, and C. E. Baltzer ; " Coking tests on coals from Western Canada," by R. E. Gilmore and R. A. Strong (including box coking tests in commercial by-product ovens, laboratory by-product carbonisation tests) ; " Low-temperature carbonisation—Continuation of tests on Canadian bituminous coals," by R. A. Strong. Copies of the report in question can be obtained by persons interested on application either to the Mines Branch of the Dominion Department of Mines at Ottawa, or to the High Commissioner of Canada, the Canadian Building, Trafalgar Square, London, S.W.1.

Poland's Chemical Industry

THE following combines exist in the Polish chemical industry, according to information obtained from the Polish Chemical Union, and from the Warsaw Chamber of Commerce : Superphosphate Industry, Ltd., Warsaw, organisation of the cartel of manufacturers of phosphate fertilisers ; sales organisation of manufacturers of lithopone in Katowice ; sales organisation of sulphuric acid manufacturers in Katowice ; sales convention among smaller Warsaw manufacturers of soap (does not include large units—regulates terms of sales only) ; combine of soap factories and oil refineries controlled by the Schicht concern ; group of deciduous wood distilleries (under the patronage of National Economic Bank) ; sales organisation of manufacturers of carbide, on the domestic market ; price-fixing combine of manufacturers of castor oil ; district cartel of bone glue and bone flour manufacturers, a branch of the " Epidos " international organisation ; an understanding in the acetic acid industry regulating prices.

Negotiations are now being conducted for the establishment of a syndicate of turpentine manufacturers, a convention of perfumery and cosmetics industry in Warsaw, and an all-Polish convention in the perfumery industry, with regard to terms of sales. Linseed oil manufacturers also contemplate the establishment of a cartel.

Polish chemical connections with international combines include the following : The Polish rayon factory in Tomaszow is controlled internationally through Snia Viscosa ; the Polish bone industry participates in the " Epidos " organisation ; and the Polish coal tar industry of Upper Silesia has connections with the German coal tar industry through Teerprodukten Vereinigung des Ostens, G.m.b.H., of Berlin, and through Chemische Werke Oberschlesiens, G.m.b.H., also of Berlin.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.
ACID, CHROMIC.—1s. 0⅝d. per lb.
ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.
ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.
ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.
AMMONIUM BICHROMATE.—8½d. per lb.
BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.
BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain.)
CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.
CHROMIUM OXIDE.—10d. and 10½d. per lb. according to quantity.
COPPER SULPHATE.—£25 to £25 10s. per ton.
METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.
NICKEL SULPHATE.—£38 per ton d/d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
POTASH CAUSTIC.—£30 to £33 per ton.
POTASSIUM BICHROMATE CRYSTALS.—4¾d. per lb. nett d/d U.K. spot; ground ½d. per lb. extra.
POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.
POTASSIUM CHROMATE.—8½d. per ld.
SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.
SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.
SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.
SODIUM ACETATE 97/98%.—£21 per ton.
SODIUM BICARBONATE.—£10 10s. per ton carr. paid.
SODIUM BICHROMATE CRYSTALS, CAKE AND POWDER.—3⅝d. per lb. nett d/d U.K. spot. Anhydrous ¾d. per lb. extra.
SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.
SODIUM CHLORATE.—2¾d. per lb.
SODIUM CHROMATE.—3½d. per. lb.
SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.
SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.
SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.
SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.
SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.
SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 8½d. per lb. Crude 60's, 2s. 4d. to 2s. 6d. per gall.
ACID CRESYLIC 99/100.—2s. 2d. to 2s. 7d. per gall. Pure, 5s. to 5s. 2d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. 2d. to 2s. 3d. Dark, 1s. 6d. to 2s. Refined, 2s. 7d. to 2s. 10d. per gall.
ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.
ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5½d. per gall. 1100, 5½d. to 6d. per gall.; 1110, 6d. to 6½d. per gall Unstrained (Prices only nominal).
BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall; Pure, 1s. 10d. to 1s. 11d. per gall.
TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 5d. per gall.
XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.
CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, 6½d to 6¾d. per gall. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 2d. to 2¼d per gall. ex works. Salty, 7½d. per gall.
NAPHTHA.—Crude, 8½d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent 90/199, 1s. to 1s. 3d. per gall.
NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.
NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.
PITCH.—Medium soft, 47s. 6d. per ton, f.o.b., according to district. Nominal.
PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb
ACID ANTHRANILIC.—6s. per lb. 100%.
ACID BENZOIC.—1s. 8½d. per lb.
ACID GAMMA.—4s. 6d. per lb.
ACID H.—3s. per lb.
ACID NAPHTHIONIC.—1s. 6d. per lb.
ACID NEVILLE AND WINTHER.—4s. 9d. per lb.
ACID SULPHANILIC.—8½d. per lb.
ANILINE OIL.—8d. per lb. naked at works.
ANILINE SALTS.—8d. per lb. naked at works.
BENZALDEHYDE.—2s. 3d. per lb.
BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.
BENZOIC ACID.—1s. 8½d. per lb.
o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots d/d.
p-CRESOL 32/34° C.—2s. per lb., in ton lots d/d.
DICHLORANILINE.—1s. 10d. per lb.
DIMETHYLANILINE.—1s. 11d. per lb.
DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.
DINITROCHLORBENZENE.—£84 per ton d/d.
DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C 9d. per lb. naked at works.
DIPHENYLAMINE.—2s. 10d. per lb. d/d.
a-NAPHTHOL.—2s. per lb. d/d.
B-NAPHTHOL.—10d. per lb. d/d.
a-NAPHTHYLAMINE.—1s. 3d. per lb.
B-NAPHTHYLAMINE.—3s. per lb.
o-NITRANILINE.—5s. 9d. per lb.
m-NITRANILINE.—3s. per lb. d/d.
p-NITRANILINE.—1s. 8d. per lb.
NITROBENZENE.—6d. per lb. naked at works
NITRONAPHTHALENE.—1s. 3d. per lb.
R. SALT.—2s. 2d. per lb.
SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d
o-TOLUIDINE.—8d. per lb.
p-TOLUIDINE.—1s. 9d. per lb. naked at works.
m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.
N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.
ACETONE.—£78 per ton.
CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.
IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.
WOOD CRESOTE.—1s. 9d. per gall. Unrefined.
WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d per gall. Solvent, 4s. to 4s. 3d. per gall.
WOOD TAR.—£3 10s. to £4 10s. per ton.
BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
ARSENIC SULPHIDE, YELLOW.—1s. 10d. to 2s. per lb.
BARYTES.—£5 10s. to £7 per ton, according to quality.
CADMIUM SULPHIDE.—5s. to 6s. per lb.
CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity
CARBON BLACK.—4½d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity. drums extra.
CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—3s. 9d. per lb.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE, 30%.—£20 to £22 per ton.
SULPHUR.—£10 to £13 per ton, according to quality.
SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra
SULPHUR PRECIP. B. P.—£55 to £60 per ton.
VERMILION.—Pale or deep, 6s. 9d. to 7s. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; extra fine powder, £38 per ton. Packed in 2-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 10½d. to 1s. 11d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 4d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE —5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.

BISMUTH CARBONATE.—8s. 9d. per lb.

BISMUTH CITRATE.—8s. 3d. per lb.

BISMUTH SALICYLATE.—8s. 3d. per lb.

BISMUTH SUBNITRATE.—7s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. 3d. per lb.

BISMUTH OXIDE.—11s. 3d. per lb.

BISMUTH SUBCHLORIDE.—10s. 3d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W Qts. 11d. per lb.

BORAX B.P.—Crystal, £21 per ton; powder, £22 per ton; powder, ex. fine, £23 per ton. Packed in 1-or 2-cwt. bags carriage paid any station in Great Britain.

BROMIDES.—Ammonium, 1s. 11½d. per lb.; potassium, 1s. 8½d. per lb.; granular, 1s. 7½d. per lb.; sodium, 1s. 10½d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 2d. to 1s. 3d. per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 9d. per lb. Green, 2s. 10d. to 3s. per lb. U.S.P., 2s. 7d. to 2s. 10d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 17s. 6d. per lb. net; Synthetic, 9s. 6d. to 11s. 9d. per lb.; Synthetic detached crystals 9s. 6d. to 12s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 6d. to 1s. 8d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 2½d. to 3s. 9d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—104s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. per lb. in 28 lb. lots Smaller quantities 1d. per lb. more.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—2s. 2d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 6d. per lb. Prices for 28 lb. lots. Smaller quantities 1d per lb. more.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 4d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb

THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—12s. per lb.

AMYL SALICYLATE.—3s. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZYL BENZOATE.—2s. 3d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—8s. 3d. per lb.

CITRONELLOL.—10s. 6d. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—10s. 6d. per lb.

GERANIOL (PALMAROSA).—19s. per lb.

GERANIOL.—7s. 6d. to 10s. per lb.

HELIOTROPINE.—7s. per lb.

ISO EUGENOL.—12s. per lb.

LINALOL.—Ex Bois de Rose, 12s. per lb. Ex Shui Oil, 10s. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—48s. per lb.

SAFROL.—2s. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—13s. to 15s. per lb. Ex Guaiacol, 13s. to 14s. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. per lb.

BERGAMOT OIL.—12s. per lb.

BOURBON GERANIUM OIL.—17s. 6d. per lb.

CAMPHOR OIL, WHITE.—160s. per lb.

CASSIA OIL, 80/85%.—4s. 9d. per lb.

CINNAMON OIL LEAF.—7s. 9d. per oz.

CITRONELLA OIL.—Java, 3s. 1d. per lb., c.i.f. U.K. port; pure, Ceylon, 2s. 6d per lb.

CLOVE OIL (90/92%).—8s. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 12s. 3d. per lb.

LEMON OIL.—8s. 6d. per lb.

LEMONGRASS OIL.—4s. per lb.

PALMA ROSA.—11s. 6d. per lb.

PEPPERMINT OIL.—English, 70s. per lb.; Wayne County, 15s. per lb.; Japanese 5s. 3d. per lb.

PETITGRAIN.—8s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, January 15, 1930.

BUSINESS during the current week has been fairly good, with prices on the whole steady. Export business is also steady.

General Chemicals

ACETONE is firm and unchanged at £71 10s. to £80 per ton, according to quantity, and in good demand.

ACETIC ACID is in good demand at £36 10s. for 80% technical and £1 per ton extra for 80% edible.

CITRIC ACID is slow; price at about 2s. 1d. per lb., less 5%.

ACID LACTIC is steady at £43 per ton for 50% by weight, and in fairly good demand.

ACID OXALIC.—Firm at £30 7s. 6d. to £32 per ton, according to quantity, and in steady demand.

ACID TARTARIC.—The position is a little easier at about 1s. 3¾d. to 1s. 4¼d. per lb., less 5%.

ALUMINA SULPHATE.—Unchanged and firm at £8 to £8 5s. per ton for the 17-18% iron-free quality.

ARSENIC.—£16 7s. 6d. to £16 17s. 6d. per ton, free on rails at mines, according to quantity.

BORAX is in good demand and slightly firmer.

CREAM OF TARTAR is steady at about £104 per ton for the 99-100% B.P. quality, and in fair demand.

COPPER SULPHATE is firm at £28 per ton, less 5%.

FORMALDEHYDE continues in good demand and steady at £36 per ton.

LEAD ACETATE.—White, £44 per ton; brown, £43 per ton, with a steady demand.

LEAD NITRATE.—Unchanged at £33 15s. per ton.

LIME ACETATE is unchanged, with a steady inquiry.

LITHOPONE.—Steady at £19 15s. to £23 per ton, according to quantity.

POTASSIUM CARBONATE.—Unchanged at £27 per ton for 96-98% arsenic-free quality.

POTASSIUM CAUSTIC is unchanged.

POTASSIUM CHLORATE is very firm at £30 per ton.

POTASSIUM PERMANGANATE is firm at 5½d. per lb. for B.P. needle crystals, and in steady demand.

SODIUM ACETATE is unchanged at about £21 10s. to £22, with a little better demand.

SODIUM BICHROMATE is firm at 3⅝d. per lb., and in steady demand.

SODIUM HYPOSULPHITE, COMMERCIAL.—£8 10s. to £9 per ton. Photographic crystals, £14 to £15 per ton.

SODIUM NITRITE is firm at £20, and in steady demand.

SODIUM PRUSSIATE is firm at 4¾d. to 5¼d. per lb., and in good request.

SODIUM SULPHIDE is unchanged, with the market very firm.

TARTAR EMETIC.—11d. per lb., and in fair demand.

ZINC SULPHATE.—Unchanged at £13 10s. per ton, and in steady demand.

Coal Tar Products

The market for coal tar products remains unchanged from last week.

MOTOR BENZOL is quoted at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r.

SOLVENT NAPHTHA remains at about 1s. 2½d. to 1s. 3d. per gallon, f.o.r.

HEAVY NAPHTHA is unchanged at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL is unchanged, at 3d. to 3½d. per gallon, f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

NAPHTHALENES.—The firelighter quality is quoted at £3 10s. to £3 15s. per ton, the 74-76 quality at £4 to £4 5s. per ton, and the 76-78 quality at about £5 per ton.

PITCH.—The nominal price remains at 47s. 6d. per ton, f.o.b. East Coast Port, but business has been done at less.

Nitrogen Products

Sulphate of Ammonia.—In view of the large supplies available, the market for sulphate of ammonia remains weak, the price being about £8 7s. 6d. per ton f.o.b. U.K. ports in single bags, neutral quality.

Home Trade.—The demand shows a slight improvement and a few orders have been received for prompt delivery. The heavy spring demand, however, has not yet set in.

Scottish Coal Tar Products

THIS market continues to be very quiet. Pitch and tar are steady, but tar acids and water white products are weak. Creosote is still causing grave anxiety, although some export orders are reported.

Cresylic Acid.—There is a lack of orders, but prices keep surprisingly steady. Nominal values remain unaltered as follows:—Pale, 99/100%, 1s. 10½d. to 2s. 0½d.; pale 97/99%, 1s. 9d. to 1s. 10d.; dark 97/99%, 1s. 7½d. to 1s. 8½d.; high boiling, 1s. 10½d. to 2s. 0½d.; all per gallon rails, makers' works.

Carbolic sixties.—There is no change to report, price remaining about 2s. 4d. to 2s. 5d. per gallon.

Creosote oil.—The position is still far from satisfactory. Large stocks of certain grades are on hand and prices are lower as follows:—Specification oil, 4d. to 4½d. per gallon; gas works ordinary, 2⅞d. to 3⅜d. per gallon; washed oil, 3d. to 3½d. per gallon, all ex works naked.

Coal tar pitch.—Supplies are short in this area. Value is firm at 52s. 6d. to 55s. per ton for coke oven and horizontal and 50s. to 52s. 6d. per ton for vertical. Export value is purely nominal at about 5s. per ton lower.

Blast furnace pitch is unchanged at 30s. per ton rails works for home trade and 35s. per ton f.a.s. Glasgow for export.

Refined coal tar.—This product continues in good demand, particularly for forward delivery. Quotations are unchanged at about 3⅞d. to 4¼d. per gallon, f.o.r. works in buyers' barrels.

Blast furnace tar is quiet and unchanged at 2¾d. per gallon at works.

Crude naphtha.—Very little business is passing and value is about 4¾d. to 5¾d. per gallon according to quality and district.

Water white products.—The demand reported last week has proved to be short-lived. Prices are nominal as follows:—90/160 solvent, 1s. 1½d. to 1s. 2¾d. per gallon; 90/190 heavy solvent, 1s. to 1s. 0½d. per gallon; benzol, 1s. 5d. to 1s. 5½d. per gallon, all free on rails works.

Latest Oil Prices

LONDON, January 15.—LINSEED OIL was firm near. Spot, ex mill, £44 10s.; January, £41 10s.; February-April, £39 2s. 6d.; and May-August, £38, naked. RAPE OIL was inactive. Crude extracted, £40; technical refined, £41 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £29; refined common edible, £34; and deodorised, £36, naked, ex mill. TURPENTINE was inactive and 3d. per cwt. lower. American, spot, 42s. 9d.; February-April, 43s. 6d.

HULL, January 15.—LINSEED OIL.—Spot, £43 15s.; January, £43 10s.; February, £42; March-April, £39 17s. 6d.; May-August, £39 2s. 6d. per ton, naked. COTTON OIL.—Egyptian crude, spot, £29; January, £28 10s.; edible refined, spot, £32 5s.; technical, spot, £31 15s.; deodorised, spot, £34 5s. per ton, naked. PALM KERNEL OIL.—Crude, 5½ per cent., spot, £31 per ton, naked. GROUNDNUT OIL.—Crushed/extracted, spot, £35; deodorised, spot, £39 per ton. SOYA OIL.—Extracted and crushed, spot, £30 10s.; deodorised, spot, £34 per ton. RAPE OIL.—Crushed/extracted, spot, £39 10s.; refined, spot, £41 10s. per ton.

South Wales By-Products

THERE is slightly more activity in South Wales by-products, but business generally is still far from satisfactory. The pitch demand remains sporadic, patent fuel manufacturers apparently holding off in the belief that a fall in values is imminent. Quotations are exchanged round about 48s. per ton delivered. Road tar quotations are unchanged at 11s. to 13s. per 40-gallon barrel, and the demand is slightly better. Solvent naphtha has a small call round about 1s. 2½d. to 1s. 4½d. per gallon, but heavy naphtha is dead at from 11d. to 1s. 1d. per gallon. Creosote remains weak with values unaltered. Refined tars continue to have a steady, moderate call, with prices for gasworks and coke oven tar unchanged. Motor benzol is steady at 1s. 3½d. to 1s. 5½d. per gallon. Patent fuel and coke exports are unchanged, but there are indications that an improvement is about to set in. Patent fuel, ex-ship Cardiff, is quoted 22s. to 22s. 6d. per ton; ex-ship Swansea and Newport from 1s. to 1s. 6d. per ton less. Coke quotations for all grades are unchanged.

New Continental Chemical Company

PRODUITS CHIMIQUES DU LIMBOURG, with headquarters at Quadmechelen (Limbourg), was formed on October 23 by the French firm Société Commerciale des Potasses d'Alsace and the Belgian Produits Chimiques de Tessenderloo. The purpose of the new company is the manufacture, purchase, and sale of sulphate of potash and its derivatives and eventually other chemical products. The capital is fixed at 30,000,000 francs.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, January 15, 1930.

SINCE our last report the heavy chemical market has maintained its fair activity since the holidays, and export inquiry particularly has been more pronounced. Prices remain practically unchanged, but there is a fair amount of competition for intermediates, and a notable reduction is the price quoted for antimony oxide, which can now be obtained at round about £31 per ton, c.i.f. U.K. ports.

Industrial Chemicals

ACETONE, B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply but prices remain unchanged as follows: 98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Quoted 8d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. 2d. per lb., less 5%, ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality 4s. per carboy. Dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at about 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 5d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material quoted £35 per ton, ex wharf. On offer for prompt shipment from China at £31 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Now quoted £18 per ton, ex wharf, prompt despatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4 ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. per ton to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Remains steady at about £36 10s. per ton, ex works.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½%, delivered.

POTASSIUM BICHROMATE.—Quoted 4⅜d. per lb. delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton, ex store. Offered from the Continent at £25 5s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODA, CAUSTIC.—Powdered, 98/99%, £17 10s. per ton in drums, £18 15s. per ton in casks. Solid, 76/77%, £14 10s. per ton in drums, and £14 12s. 6d. per ton for 70/75% in drums, all carriage paid buyers' stations, minimum 4-ton lots, for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅜d. per lb., delivered buyers' premises with concession for contracts.

SODIUM CARBONATE. (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 13s. per ton, ex quay, minimum 4-ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £9 9s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, but demand in the meantime is small.

SODIUM PRUSSIATE.—Quoted 5½d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 55s. per ton, ex works, 57s. 6d. per ton delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid, 60/62%, £9 per ton. Broken, 60/62%, £10 per ton. Crystals, 30/32%, £7 2s. 6d. per ton, delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material now offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—Please note that the above prices are for bulk business and are not to be taken as applicable to small parcels.

Taxation of White Spirit: F.B.I. Protest

THE Executive Committee of the F.B.I. at their meeting last week considered the question of the taxation of white spirit when used as a raw material or in processes of manufacture, against which the strongest protests had been made, on behalf of the trades concerned, to the Chancellor last spring. Notwithstanding the representations, the concession was refused.

It was pointed out that the tax was on an essential raw material of many industries and would, therefore, have the effect of increasing costs. Although there was a rebate for export trade, it was stated that the procedure for obtaining this was very cumbersome, slow, and expensive. Moreover, as most exports from the U.K. contained paint or varnish in some form, the result of the duty was a general increase in the cost of production. As a result of the discussion, the Committee passed the following resolution:—

"The Federation of British Industries, in the interest of its members to whom white spirit is an indispensable element in their manufacture, desires strongly to urge the Chancellor of the Exchequer to mitigate as far as possible the addition to the cost of production occasioned by the duty now imposed on this essential raw material. The Federation trusts that the Chancelllor will give his most sympathetic consideration to the representations that are about to be made to him by the Trade Associations representing the largest users of white spirit."

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, January 16, 1930.

A moderate volume of inquiry has been in evidence on the chemical market here during the past week and a fair actual demand, the bulk of it relating to prompt or near delivery positions, has been reported. After the seasonal slackness of the past three or four weeks, business is now getting back to something like it was before the holiday break. Quotations are steady generally, tartaric and citric acids, however, forming rather notable exceptions.

Heavy Chemicals

A fair spot trade is being done in bichromate of soda and steady contract deliveries are being made; prices are well maintained at 3⅜d. per lb., subject to varying discounts according to quantity. Chlorate of soda is still only in comparatively quiet demand, but the tone seems to be steadier, current offers being at about 2¾d. to 2⅞d. per lb. Sulphide of sodium is a steady section and a moderate amount of buying interest is being shown: the 60–65 per cent. concentrated solid quality ranges from £10 to £14 per ton, according to quantity, and the commercial material at from £8 2s. 6d. to £9 2s. 6d. Contract offers of alkali continue in the neighbourhood of £6 per ton and a moderate weight of business is being put through. Phosphate of soda has been in limited demand this week, but values are steady at round £11 per ton for the di-basic material. Prussiate of soda is attracting a fair amount of attention and prices are firm at from 4¾d. to 5¼d. per lb., according to quantity. Hyposulphite of soda is quiet but steady at about £15 per ton for the photographic grade and £9 5s. for the commercial. Caustic soda is moving in fair quantities, mainly against contract commitments, and prices are firm at from £12 15s. to £14 per ton, according to quality. There is a moderate buying movement in the case of bicarbonate of soda, offers of which keep up at about £10 per ton.

The price position of yellow prussiate of potash shows no change, and a steady business is being put through in this section at from 6¾d. to 7¼d. per lb., according to quantity. Current values of chlorate of potash are at round 2¾d. per lb., but the demand at the moment is of relatively quiet extent. There is a steady inquiry about in the case of bichromate of potash and quotations are very firm on the basis of 4¾d. per lb. Carbonate of potash is fairly steady at from £26 to £26 5s. per ton and on the whole a moderate amount of business is being done. With regard to caustic potash, the demand for this is comparatively slow, but at about £30 10s. per ton there has been little alteration in prices. A quiet trade is passing in permanganate of potash, offers of which are steady at about 5½d. per lb. for the B.P. product, the commercial material selling at up to 5¼d. per lb.

There has been no apparent expansion in the demand for arsenic, but prices are no easier, round £16 per ton being the general quotation for white powdered, Cornish makes. Sulphate of copper is steady at up to £27 per ton, f.o.b., with buying interest on moderate lines. The acetates of lime meet with a quiet demand at £16 per ton for the grey material and £7 15s. for the brown. Inquiry in the case of the lead compounds is on a restricted scale, with white and brown acetate on offer at £39 and £38 10s. per ton, and nitrate of lead quoted at about £33.

Acids and Tar Products

A somewhat lower range of values is being indicated in respect of tartaric acid, prices being at about 1s. 3½d. to 1s. 3¾d. per lb. Citric acid, also, has shown further weakness, current quotations being no better than about 1s. 11¼d. per lb. Oxalic acid meets with a moderate demand and prices are maintained at £1 13s. per cwt., ex store. Acetic acid is firm at about £66 per ton for the glacial quality and £36 10s. for the 80 per cent. commercial, and a fair amount of buying interest is being shown.

Pitch keeps steady and meets with a moderate inquiry, with current values at round 47s. 6d. per ton, f.o.b. Creosote oil is not too strong and at 3¾d. to 4¼d. per gallon, naked at works, the demand is restricted. Solvent naphtha, however, keeps up at about 1s. 2½d. per gallon and a quietly steady business is being done. Carbolic acid is firm and well sold forward at round 2s. 7d. per gallon, naked, for crude 60's, and 9¼d. per lb. for available parcels of crystals.

Company News

Distillers Co.—An interim dividend of 7½ per cent. has been declared on the ordinary shares.

Allen-Liversidge.—An interim dividend of 4 per cent. has been declared on the ordinary shares, payable on February 1.

Electrolytic Zinc Co. of Australasia.—It is announced that a dividend at the rate of 12 per cent. per annum for the six months ended December 31 last is to be paid on March 6 on the whole of the issued shares.

Lagunas Nitrate Co.—The directors of the Lagunas Nitrate Co. state that the scheme for amalgamation with the Lagunas Syndicate has been approved by the debenture holders of the latter undertaking. The scheme will be submitted for the approval of the shareholders of the Lagunas Nitrate Co. at a meeting called for January 22.

Norwegian Production of Kelp

About 75 per cent. of the entire production of kelp from seaweed in Norway in 1929 was exported to Scotland and England, for use in the manufacture of iodine and potash. Unfavourable weather prevailing during summer and autumn resulted in seaweed ash being produced chiefly during the first seven months of the year. The peasants were unable to handle the exceptionally large quantities of seaweed gathered during the month of April before deterioration. No official statistics as to the total production of kelp are available, but it is estimated by one of the leading exporters to be approximately 7,260,000 lb., as against 9,130,000 lb. in 1928, and 7,040,000 lb. in 1927.

According to the Stavanger custom house statistics, exports of seaweed ash during the first ten months of 1929 were 5,217,744 lb., compared with 5,714,706 lb. during 1928 and 4,066,724 lb. in 1927. Total 1928 exports from Norway amounted to 6,563,603 lb., while in 1927 exports were 6,046,695 lb. The kelp is said to be of good quality, and it is reported that the average price received by the burners this season was the same as last year.

Netherlands Trade in Sulphuric Acid

Sulphuric acid production in the Netherlands is estimated to be at least 200,000 tons yearly in addition to imports, which averaged roughly the same amount for the two years, 1927 and 1928. Since the exports for those years were only 21,719 and 37,726 tons, the entire domestic consumption approximates 375,000 to 400,000 tons. The principal use of this acid is for superphosphate manufacture. For this, there are some seven well-equipped factories turning out also compound fertilisers, phosphoric acid and sodium fluosilicate. The sources of the 1928 imports, which totalled 183,302 tons, were: Belgium, 151,653 tons; Germany, 26,570 tons; and Great Britain, 4,869 tons. The 1928 exports, totalling 37,726 tons, went to Germany (18,040), Belgium (5,127), Curacao (3,798), and the balance to other countries. Total exports of this acid for the first half of the present year were 30,389 tons, compared with 14,075 tons for the same period of 1928.

Chemical Condiment Industry in China

A research institute supported by the chemical condiment industry has been organised in Shanghai to solve problems hindering the expansion of the Chinese factories as demanded by the market, according to Shanghai advices to the American Chemical Society. The chief difficulties lie in the shortage of raw materials. The demand for wheat starch is limited in China, and the chemical condiment manufacturers are often forced to reduce their production on account of the shortage of gluten. Manufacture of gluten and conversion of starch into dextrin, glucose, caramel, alcohol, maltose, etc., are planned by at least two prominent manufacturers. The Chinese wheat kernel contains little protein, and Canadian wheat flour is the source of gluten. Although in Shanghai there is one company producing hydrochloric acid, the output is so small that the manufacturers of chemical condiment depend chiefly on Japanese supply.

Industrial Steam Boiler Plant

Another Example of Economy

SUBSTANTIAL savings are always a practical possibility in the operation of a large number of industrial steam boiler plants, alike for large and for small installations. A typical example is the Holden Wood Bleaching Co., Ltd., of Haslingden (Lancashire), who installed "Turbine" forced draught steam jet furnaces on their boilers in 1926, with hand-firing as usual, the general conditions being difficult because of the violent fluctuations in the demand for steam, characteristic of many establishments, including chemical works. In a letter they state that these furnaces have been very successful, enabling a cheaper grade of coal to be burnt with actually a lower consumption weight for weight, with therefore a substantial saving on the annual fuel bill. The total maintenance costs have so far been practically nil, about 15s., while the cleaning out is easier, this being due to the fact that the steam keeps the grates cool and prevents melting of the ash and clinker formation, the material being granular and therefore much less troublesome to handle. In another case, at Kirkcaldy in Scotland, a boiler plant, also in the textile industry, with much low pressure "boiling" steam used, was burning 17 to 18 tons per week of double washed nuts at 21s. per ton, which incidentally resulted in much smoke. After installing "Turbine" furnaces the same steam is supplied by 15 tons of "duff" small coal at 13s. per ton, cutting the fuel bill in half. A special trial undertaken showed that 60 tons of this "duff" coal lasted five weeks, the previous consumption had been about 70 to 75 tons a month. Naturally the saving to be obtained on any given boiler plant varies according to the local conditions, especially as regards relative prices and qualities of fuel available. The main point is, however, that furnaces of this character, hand-fired as usual, with only one steam valve to control, enable almost any fuel to be burnt by means of the forced draught blast, which results in adequate furnace temperature being obtained with maximum emission of radiant heat.

French Trade in Lactic Acid

Imports and Exports

PRODUCTION of lactic acid in France is estimated at 800 metric tons annually, this amount being almost entirely destined for industrial consumption in the tanning, dyeing and allied industries. The use of lactic acid in edible form has not progressed beyond the experimental stage. In fact, the general opinion in the trade is that total annual consumption for food purposes does not exceed 10 metric quintals.

Judging from the projects now under consideration, the use of lactic acid as a substitute for tartaric or citric acid will appreciably increase within the next few years. Nearly the whole French output of both industrial and edible lactic acid is produced by the Société Normande de Produits Chimiques, a subsidiary of the Rhone-Poulenc. Current prices range from six to seven francs per kilo. for industrial lactic acid, and from 16 to 17 francs for lactic acid in edible form.

The following table indicates the French trade in this product during the past four years.

Year.		Imports. Quantity. Metric Quintals.	Imports. Value. 1,000 Francs.	Exports. Quantity. Metric Quintals.	Exports. Value. 1,000 Francs.
1926	Industrial	91	244	238	390
	Pure	—	—	—	
1927	Industrial	58	128	118	101
	Pure	—	—	—	
1928	Industrial ..	276	259	448	245
1929*	Industrial ..	128	95	91	46
	Pure ..	58	26	15	10

* First 5 months.

(Metric quintal = 220·5 pounds.)

Industrial Publicity Merger

AN agreement has been entered into between Industrial Publicity Services, Ltd., 4-7, Red Lion Court, Fleet Street, and Foster Turner, Ltd., Worcester House, Walbrook, under which the two firms will be able to place their united organisations at the disposal of their clients for all departments of commercial and financial publicity.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

HERTZ AND CO., 9, Mincing Lane, E.C., manufacturing chemists. (C.C., 18/1/30.) £13 11s. 9d. December 4.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BRANNAM (C. H.), LTD., Barnstaple, pottery manufacturers. (M., 18/1/30.) Registered January 2, £2,000 debenture, to M. B. Snell, Higher Leigh, Combemartin, J.P., and another; general charge. *Nil. April 9, 1929.

FOUNTAIN YARN DYERS (BLACKBURN), LTD. (M., 18/1/30.) Registered January 6, £4,000 debentures; general charge. *Nil. December 14, 1929.

HENEWARD CHINA CLAY CO., LTD., London, E.C. (M., 18/1/30.) Registered December 27, series of £5,000 debentures and premium of 10 per cent. present issue £1,800; charged on land at St. Breward, also general charge. *——. December 31, 1928.

Satisfactions

GIBSON AND SONS, LTD., Burslem, china manufacturers. (M.S., 18/1/30.) Satisfaction registered January 2, £100, part of amount registered April 19, 1905.

GOSNELL (JOHN) AND CO., LTD., London, S.E., perfume manufacturers. (M.S., 18/1/30.) Satisfaction registered January 3, all moneys, etc., registered April 6, 1910.

London Gazette, &c.

Company Winding Up Voluntarily

NEW PROCESS LUBRICATING OILS, LTD. (C.W.U.V., 18/1/30.) By extraordinary resolution, October 5th. E. Marsden, A.I.S.A., Borough Chambers, Darwen, Lancashire, appointed as liquidator.

Order Made on Application for Discharge

WHIPMAN, Philip, lately St. Dunstan's House, 8, Cross Lane, London, E.C.3, and 6, Baker's Row, Farringdon Road, London, E.C.1, drug merchant. (O.M.A.D., 18/1/30.) Discharge suspended for three months, until March 3.

New Companies Registered

CHISWICK PRODUCTS, LTD., Burlington Lane, Chiswick, London, W.4.—Registered as a "private" company on January 11. Nominal capital £1,700,000 in £1 shares (985,165 5 per cent. cumulative preference and 396,041 "A" ordinary and 318,794 "B" ordinary). The objects are to acquire the undertakings carried on by the Chiswick Polish Co., Ltd., and the Nugget Polish Co., Ltd., and to carry on the business of manufacturers of and dealers in polishes, dressings and blacking, etc., druggists, drysalters, oil and colourmen. Directors: J. Squiers, A. L. Reckitt, D. Fitte, W. H. Slack, E. W. Hull, P. B. Reckitt, A. H. Hadwen, J. McLaren, C. L. O. Cleminson, A. M. Turner.

HAMPTON CHEMICAL CO., LTD., 137, Fenchurch Street, E.C.3.—Registered January 10. Nominal capital, £1,650 in 1,500 7½ per cent. cumulative participating preference shares of £1 each and 1,500 ordinary shares of 2s. each. Chemical manufacturers, dealers in chemicals, manufacturers of chemical specialities, etc. Directors: F. B. Ancock and J. C. J. Clerk.